"Ward Herst" <wherst@herstassociates .com>

12/16/2008 04:06 PM

To Daniel Wall, "'Victoria Warren'"

cc

bcc

Subject West Lake Landfill OU-2 RD QAPP

4 attachments

12-16-08 Bridgeton OU-2 Remedial Design QAPP Text, Tables.pdf

12-16-08 Bridgeton OU-2 Remedial Design QAPP Figures Set 1.pdf

12-16-08 Bridgeton OU-2 Remedial Design QAPP Figures Set 2.pdf

12-16-08 Bridgeton OU-2 Remedial Design QAPP Appedices.pdf

Attached is the West Lake Landfill Operable Unit 2 Remedial Design Quality Assurance Project Plan developed by Herst & Associates, Inc. and CEC, Inc. on behalf of Laidlaw Waste Systems, Inc. Hardcopies will be submitted via overnight courier to USEPA and MDNR.

Thank you for your time and attention.

Ward Herst, Managing Director
(636) 939-9111 phone
(636) 939-9757 fax

Remedial Design Environmental Quality Assurance Project Plan (RD QAPP)

West Lake Landfill Site
Operable Unit 2 (OU-2)
Bridgeton, Missouri

Revision No. 0
Revision Date: December 14, 2008

Civil & Environmental Consultants, Inc.

HERST & ASSOCIATES, INC.®

4630 South Highway 94
North Outer Road
St. Charles, Missouri 63304
Telephone: (636) 939-9111
Facsimile: (636) 939-9757

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REMEDIAL DESIGN ENVIRONMENTAL
QUALITY ASSURANCE PROJECT PLAN (QAPP)
for the
WEST LAKE LANDFILL OU-2 FACILITY

A1. SIGNATURE / APPROVAL PAGE

Approved by:

Dan Wall - USEPA Project Manager	Date
Ward Herst, PG - Project Coordinator	Date
Jonathan Wilkinson, PE – Project QA Officer	Date
Randal F. Bodnar, PE – Remedial Design Manager	Date

A3. DISTRIBUTION LIST

The following individuals will receive copies of the approved Remedial Design Environmental Quality Assurance Project Plan (RD QAPP) and subsequent revisions:

Dan Wall, RPM - US EPA Region 7
Shawn Muenks - Missouri Department of Natural Resources
Ward Herst, PG, Project Coordinator – Herst & Associates, Inc.
Jonathan Wilkinson, PE, Project QA Officer – Herst & Associates, Inc.
Randal F. Bodnar, PE, Design Manager - CEC, Inc.
Kevin Kamp, PE, Landfill Designer – CEC, Inc.
Douglas Marian, Environmental Engineer - CEC, Inc.

Courtesy copies will be provided to others, including Respondent and Respondent's individual contractors.

A4. PROJECT / TASK ORGANIZATION

A project organization chart is provided as **Figure A-1**. Contact information for the individuals listed below is provided in **Table A-1**. The individuals participating in the project and their roles and responsibilities are discussed below:

Ward Herst, PG, Project Coordinator; Herst & Associates, Inc.

Mr. Herst will have overall responsibility for successful project completion, and will provide the interface between the US EPA and MDNR, the Respondent, and the Remedial Design Group.

Jonathan Wilkinson, PE, Project Quality Assurance Officer, Herst & Associates, Inc.

Mr. Wilkinson will have overall responsibility for project quality assurance.

Randal Bodnar, PE, Design Manager, CEC, Inc.

Mr. Bodnar will be responsible for overall engineering design activities.

Kevin Kamp, PE, Landfill Designer, CEC, Inc.

Mr. Kamp will be responsible for design of the Remedial Action.

William Kankolenski, PLS, Lead Surveyor, CEC, Inc.

Mr. Kankolenski will be responsible for the field surveying and creation of a base map to be utilized in the design of the Remedial Action.

Douglas Marian, Environmental Engineer, CEC, Inc.

Mr. Marian will be responsible for preparation and coordination of engineering workplans and design deliverables.

Steve Jett, PE, Laboratory Quality Assurance Officer, Herst & Associates, Inc.

Mr. Jett will be responsible for coordination between the field sampling teams and the analytical laboratory, and will be responsible for data validation activities.

Shane Tamborski, Field Supervisor, Herst & Associates, Inc.

Mr. Tamborski will be responsible for day-to-day oversight of field sampling teams and field sampling equipment.

David Vasbinder, Health and Safety Officer, Herst & Associates, Inc.

Mr. Vasbinder will be responsible for non-radiological health and safety of field sampling team members.

Kay Clay, Laboratory Project Manager, TestAmerica, Inc.

Ms. Clay will be responsible for laboratory analyses of samples delivered to TestAmerica, Inc. from the West Lake Landfill OU-2 facility and will be responsible for laboratory analytical report preparation.

A5. PROBLEM DEFINITION / BACKGROUND

Environmental conditions at the West Lake Landfill OU-2 facility (**Figure A-2**) have been previously defined by past studies. Existing facility features, including monitoring wells and other environmental monitoring locations near OU-2, are provided in **Figure A-3**. Proposed activities described in this RD QAPP are intended to enhance the decision making process for the Remedial Design Work Plan by providing an updated assessment of environmental conditions in the vicinity of the West Lake Landfill OU-2 facility.

A6. PROJECT / TASK DESCRIPTION AND SCHEDULE

Work to be performed in accordance with this RD QAPP consists of:

- Ground and aerial topographic survey and base map preparation;
- Geotechnical testing and determination of estimated volumes for potential borrow areas;
- Installation and monitoring of temporary landfill gas perimeter monitoring probes;
- Collection and evaluation of existing cover thickness and material samples from OU-2;
- Evaluation of stormwater conveyance and leachate pumping well structures within and near the boundaries of the Inactive Sanitary Landfill that comprises OU-2;
- Collection of samples from selected groundwater monitoring wells for analysis of constituents of concern;
- Level 4 validation of groundwater monitoring and soil sampling laboratory analytical results;
- Verification of slope stability along western side of the Inactive Sanitary Landfill;

- Confirmation of property ownership extent along Old St. Charles Rock Road; and,
- Report preparation and submittal to the US EPA and the MDNR.

Each of the above-referenced tasks is briefly described below.

A6.1 Ground and Aerial Topographic Survey and Base Map Preparation

The current topographic map is based on a 2005 aerial survey combined with typical ground confirmation and is considered accurate to within plus or minus 1 foot of vertical elevation. This level of accuracy is not sufficient for purposes of calculating necessary volumes of materials necessary to meet the objectives of the West Lake Landfill OU-2 remedy (i.e., cover placement). Accordingly, during the RD phase of the project a more detailed ground survey will be conducted, with the goal of yielding ground surface elevations accurate to with 0.25 feet throughout the Inactive Sanitary Landfill that comprises OU-2. The ground survey will be combined with a more recent aerial flyover and photography to provide the level of detail sufficient for calculating necessary material volumes to achieve planned final grades. This data will then be used to create a more accurate base map of the existing topographic conditions.

A6.2 Testing of Potential Borrow Areas

As part of the West Lake Landfill OU-2 remedy, various materials will be placed and compacted within the Inactive Sanitary Landfill that comprises Operable Unit 2 to achieve planned final grades. In order to accurately estimate needed volumes of materials, it is necessary to identify the density of materials in their current location and then conduct testing to quantify the achievable density of those same materials after undergoing excavation, transport, placement, and compaction. As part of the RD phase of the project, testing will be conducted on various potential sources of materials to yield this critical information.

In addition, any soils that may be used for final cover must meet permeability specifications. As part of the RD phase of this project, laboratory testing will be conducted on potential sources of low-permeable final cover soils, with particular attention to the relationship between moisture content, compaction, and permeability. The resultant data are critical for construction and will be identified in the Remedial Action construction specifications to be developed after completion of the RD phase of the project. Three potential borrow areas are displayed in **Figure A-5**.

A6.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

For the purposes of the assessment of environmental conditions to support the Remedial Design Work Plan, temporary landfill gas perimeter monitoring probes are proposed to be installed at the West Lake Landfill OU-2 facility. Two (2) temporary landfill gas monitoring probe screened intervals are proposed to be installed at each location to allow monitoring of discrete zones. The upper zone probe at each location will be screened from approximately five (5) feet to approximately twenty (20) feet below ground surface and the lower zone probe at each location will be screened from approximately twenty-five (25) to approximate thirty-five (35) feet below ground surface. Temporary landfill gas perimeter monitoring probes are proposed to be installed at the approximate locations presented in **Figure A-4**.

Results of the temporary perimeter landfill gas monitoring probe installation activities will be provided in the Data Evaluation Summary Report.

It is anticipated that various temporary landfill gas perimeter monitoring probes could be damaged during construction activities or would otherwise need to be removed to facilitate construction activities. To the extent that various temporary landfill gas perimeter monitoring probes remain viable after construction, it is proposed that they remain available for use as long-term monitoring locations.

Subsequent to completion of temporary perimeter landfill gas monitoring probe installation activities, quarterly measurements for methane will be performed at the installed temporary landfill gas perimeter monitoring probes.

Results of the quarterly methane measurements are expected to be used during the Remedial Design process to assess the status of decomposition gases in the West Lake Landfill OU-2 facility. Results of the quarterly methane measurements will be provided to the US EPA and the MDNR in the monthly report following the month in which the data were collected.

A6.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

The Feasibility Study included an estimate of the volumes of materials to be needed for final cover on the Inactive Sanitary Landfill. The estimate was based on existing cover thickness data collected in 1995. To help refine the volume estimate, and in conjunction with the planned supplemental aerial flyover and topographic survey to be conducted, supplemental cover thickness testing will be performed during the Remedial Design. The supplemental cover thickness testing program will include collecting cover thickness samples on a surveyed grid pattern of approximately 150 feet across the Inactive Sanitary Landfill, as illustrated on **Figure A-6.**

Each sampling point will initially be surveyed for northing, easting, and ground surface elevation. Clear polyethylene tube samplers (or similar type of sampler) will then be pushed to depth through the existing cover at each sampling location. Each sampler will be brought to the surface and visually examined to distinguish materials and measure corresponding material thicknesses.

In addition, approximately thirty (30) Shelby Tube samples will be collected adjacent to selected sampling locations for permeability testing at an off-site laboratory. These samples will also help indicate and confirm whether excess cover materials are available within portions of OU-2 or if additional material needs to be added to each localized area. The average thickness of the topsoil to be removed and reinstalled after construction will be established.

A6.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

During a recent site walkover of the Inactive Sanitary Landfill to confirm current conditions, the Landfill Design team noted the presence of various grates along the western portion of OU-2 that appear to represent stormwater conveyance structures. In addition, a leachate pumping well was observed to the east of OU-2. These features are displayed in **Figure A-7**.

At least one of the inferred stormwater conveyance structures appears to be completely silted-in. The outlets for the inferred stormwater conveyance structures could not be located due to existing vegetation growth on the Inactive Sanitary Landfill. Because proper stormwater conveyance is a key goal for the OU-2 remedy, an evaluation of the inferred stormwater conveyance structures will be performed as part of the RD phase.

Initially, the locations of the presumed stormwater grates will be plotted on the survey base map previously described in Section A6.1. Structural details will also be acquired. A geophysical survey or sewer inspection camera will then be utilized to establish the routing and discharge points of the stormwater conveyance lines. The surveyors will locate the routing and discharge points for subsequent use in the design of the OU-2 remedy. If the conveyance lines are completely silted in or are otherwise unusable, the lines will likely be abandoned. A functional stormwater conveyance system will then need to be incorporated as part of the RD.

In addition, an evaluation of the existing leachate pumping well will also be conducted. Its location will be similarly plotted on the survey base map. Detailed information regarding its structural design and functionality will then be acquired from the landfill operators. The resulting information will be evaluated to determine whether the pumping well can be incorporated into the OU-2 RD or if a separate leachate system needs to be designed.

A6.6 Sampling and Analyses of Selected Groundwater Monitoring Wells

Subsequent to US EPA approval of this RD QAPP, one (1) groundwater monitoring event will be conducted at selected groundwater monitoring wells associated with the Inactive Sanitary Landfill that comprises OU-2. The groundwater monitoring event is proposed to provide an update to groundwater quality conditions near the Inactive Sanitary Landfill documented during Remedial Investigation / Feasibility Study (RI / FS) activities. In 2003 and again in 2004 a series of monitoring wells were sampled to provide confirmation results. Of the wells sampled in 2003 and 2004, several were associated with what is now the recently-closed Active Sanitary Landfill, while five others were located near the Inactive Sanitary Landfill that is the focus of the OU-2 Remedial Design. These same five monitoring wells are proposed to be sampled once during the RD phase of the project to provide additional confirmation data. Locations of monitoring wells proposed for the groundwater monitoring event are provided in **Figure A-8**.

The analytical data associated with groundwater sampling will be included in the monthly progress report following the month in which they were received. Interpretations of the data, including data validation results, will be provided in the Data Evaluation Summary Report.

A6.7 Validation of Laboratory Analytical Results

All laboratory analytical results for groundwater samples and soil samples will be validated in accordance with the requirements of a Level 4 validation program.

Data validation summary reports will be provided to the US EPA and the MDNR as part of the Data Evaluation Report.

A6.8 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

The OU-2 Feasibility Study Report noted that slopes along the western portion of the Inactive Sanitary Landfill near Old St. Charles Rock Road were reportedly re-graded in 1992 with a goal of achieving a 3:1 or less slope (instead of its prior 2:1 ratio). Based on a recent site walkover completed by the Landfill Design team and a review of the 2005 topography available for the Inactive Sanitary Landfill, CEC has concluded that portions of the western slope of the Inactive Sanitary Landfill may not currently meet 3:1 or 2:1. **Figure A-9** displays the location and contour details of the western slope.

There is no evidence of movement of the fence that was reportedly installed along the western slope in the mid-1990's. The existing slopes were also well-vegetated. The alignment of the fencing and the vegetation indicate that the current slope is stable.

As one of the RD tasks, an evaluation will be conducted to further document the history and stability of the existing slope. A detailed assessment of the western slopes will be performed upon completion of the ground and aerial topographic survey previously described in Section A6.1. In addition, a series of thirteen (13) survey pins will be installed in the western slope. The pin locations are displayed in **Figure A-9**. These pins will be surveyed on a monthly basis during the RD phase to document slope stability.

If additional documentation of slope stability is warranted, an on-site assessment of existing vegetation along the western slope may be implemented. Derived conclusions would be documented to further substantiate the stability control provided by existing vegetation.

If additional documentation of slope stability is warranted by noticeable movement in the slope during the RD phase, a geotechnical sampling investigation may be implemented. Such an evaluation would require a significant number of soil borings to identify any potential failure planes or unstable portions of the western slope. This option would represent a destructive method for evaluation of the existing western slope.

A6.9 Confirmation of Property Ownership Along Old St. Charles Rock Road

The extent of property ownership is obviously a key component to a proper Remedial Design. With regard to OU-2, the extent of property ownership along Old St. Charles Rock Road is particularly important due to planned installation of perimeter landfill gas monitoring probes and as far as final cover slope and extent on the Inactive Sanitary Landfill. Anecdotal information suggests that property ownership may extend some distance into what was formerly Old St. Charles Rock Road but has now reportedly been abandoned. Given the presence of a high-capacity fiber-optic line along the toe of the Inactive Sanitary Landfill near Old St. Charles Rock Road, drilling of perimeter landfill gas monitoring probes described earlier in Section A.6 may be problematic and will at the least require careful delineation of the fiber-optic line location. If property ownership extends some distance into Old St. Charles Rock Road, perimeter landfill gas probes can be located some distance away from the fiber-optic line while still meeting the goal of obtaining landfill gas data at the property boundary.

A7. DATA QUALITY OBJECTIVES AND CRITERIA

Valid data of known and documented quality are required for the Remedial Design decision making process.

The ground and aerial topographic survey and base map preparation is intended to address an identified need for a more accurate ground surface topography within the Inactive Sanitary Landfill. The increased ground surface elevation accuracy will be used to refine the material volume estimates.

The testing of potential borrow areas is intended to address an identified need for materials density both at the source and after excavation, transport, placement, and compaction. This task is also intended to address an identified need for quantification of permeability for potential final cover soils, along with moisture/density relationships of the potential final cover soils. These testing activities are expected to provide data which can be used to address these data needs, which in turn will allow refinement of materials volume calculations and costs, as well as eventual development of construction specifications for use during the Remedial Action.

Landfill gas perimeter probe installation and monitoring is intended to address an identified data need for determining the current gas generation and movement the perimeter of the Inactive Sanitary Landfill. Results of the temporary landfill gas perimeter probe monitoring are expected to be utilized to assist Remedial Design decision making concerning the potential incorporation of a landfill gas management system in the West Lake Landfill OU-2 facility Remedial Design.

The evaluation of existing cover thickness and material is intended to address an identified need to verify the thickness of existing soil and low-permeability cover materials within the boundaries of the Inactive Sanitary Landfill, as well as to refine the previous thickness estimates based on 200-foot spacing through collection of data on a closer grid spacing. Results of the cover thickness and material evaluation are expected to be utilized to assist in scoping cover placement activities necessary during the remedial action as well as refining the estimate of material volumes needed to achieve final cover goals.

The evaluation of stormwater conveyance and leachate pumping well structures is intended to address an identified need to verify the ability of existing stormwater conveyance structures within the Inactive Sanitary Landfill to pass rainfall / runoff. The results of the evaluation are expected to yield data that can be incorporated into an overall stormwater management plan for the Inactive Sanitary Landfill during and after the Remedial Action. A similar evaluation will be conducted to assess the functionality of an existing leachate pumping well and its potential incorporation into the OU-2 RD.

The groundwater monitoring event is proposed to provide an update to groundwater quality conditions encountered during Remedial Investigation / Feasibility Study (RI / FS) activities. Analytical results of the groundwater monitoring event will be compared (on a value-to-value basis) to applicable Groundwater Protection Standards (GPSs). In accordance with Section II.B.3 of the Remedial Design Statement of Work (RD SOW), applicable GPSs will consist of standards listed in the Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings (40 CFR 192 Subparts A and B) and the Missouri Solid Waste Rules for Sanitary Landfills (10 CSR 80-3.010(11)).

The verification of slope stability along the western portion of the Inactive Sanitary Landfill is intended to address an identified need for comparing the existing slope to ARARs. The results of the slope stability verification program are intended to be used to meet the goals of a stability demonstration, or alternatively, identify the need for a modified slope along the western portion of the Inactive Sanitary Landfill.

The property ownership confirmation evaluation along Old St. Charles Rock Road is intended to provide verification of property ownership from which remedial design and remedial action decisions can be based. For example, if property ownership is determined to extend some distance into Old St. Charles Rock Road that has been abandoned, placement of perimeter landfill gas monitoring probes can be adjusted to provide increased confidence of avoiding fiber-optic lines present at the base of the Inactive Sanitary Landfill while still meeting the goal of obtaining landfill gas data at the property boundary.

A8. SPECIAL TRAINING / CERTIFICATION

Specialized training for field activities off-site analyses (performed by the analytical laboratory), and data validation have not been identified as necessary during the planning of this project. The proposed activities are part of routine activities performed by competent, knowledgeable, and experienced professionals in the fields of environmental science and engineering. The Herst & Associates, Inc. field team leader will be responsible for ensuring that all members of the field team have valid and current specialized training required by OSHA regulations.

A9. DOCUMENTS AND RECORDS

Records for this project will include miscellaneous correspondence, field logs, field data worksheets, laboratory analytical reports, data validation reports, and a final report. Well condition reports, field purging and sampling sheets, chains of custody, analytical data, and a summary will be submitted to the US EPA Project Manager and to the MDNR Project Manager as part of the Data Evaluation Report. Field information logs for perimeter landfill gas probe monitoring and groundwater purging and sample collection will be used to record field measurements. Each page of the field information logs will be dated and signed by the person(s) making the entries.

Laboratory analytical reports for groundwater monitoring will be generated for all samples received by the analytical laboratory. Each laboratory analytical report will be signed by the designated laboratory project manager, will be provided in a Contract Laboratory Program (CLP) style format, and will include at a minimum:

- A laboratory case narrative;
- A copy of complete chain of custody forms;
- Raw calibration results;
- Raw sample results;
- Raw laboratory Quality Assurance / Quality Control (QA/QC) sample results, including method blank results, laboratory duplicate results, matrix spike results, matrix spike duplicate results, laboratory control sample results, Bromofluorobenzene (BFB) tune results (for Volatile Organic Compounds analysis),

Decafluorotriphenylphosphine (DFTPP) tune results (for Semivolatile Organic Compounds analysis), system monitoring compound (surrogate) results, and internal standard results;

- Sample analytical sequences (run logs);
- Applicable CLP data forms (e.g. Form I's, Form II's, Form III's, etc.) for each analytical method.

B1. SAMPLING PROCESS DESIGN

For the West Lake Landfill OU-2 facility, the number, placement, and frequency of sampling / monitoring locations described below are intended to assist in the decision-making process for the Remedial Design.

B1.1 Ground and Aerial Topographic Survey and Base Map Preparation

There are no specific sampling process design needs associated with the ground and aerial topographic survey and base map preparation task. A licensed, experienced surveying company will be used to conduct the needed ground survey in sufficient detail to provide accuracy to within 0.25 feet vertical ground elevation throughout the Inactive Sanitary Landfill.

B1.2 Testing of Potential Borrow Areas

To meet the objectives of this task, a sufficient number of samples will be collected and tested from each potential source that the Landfill Design Manager can attest with confidence that the data are sufficiently detailed to meet the data quality objectives. It is likely that a minimum of three (3) to five (5) samples will be required from each potential source. The Landfill Design Manager will have final authority for determining the appropriate number of samples, type of sampling, and testing to be conducted.

B1.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

For the purposes of the assessment of subsurface conditions to support the Remedial Design, temporary landfill gas perimeter monitoring probes are proposed to be installed at the West Lake Landfill OU-2 facility. Temporary probes are proposed for gas monitoring because the facility believes that use of heavy equipment during subsequent Remedial Action activities (cap construction) will likely result in severe damage or the destruction of landfill gas perimeter monitoring probes. If required, permanent landfill gas perimeter monitoring probes will be installed subsequent to Remedial Action construction activities.

Temporary landfill gas perimeter monitoring probes are proposed to be installed at the approximate locations presented in **Figure A-4**. Temporary landfill gas perimeter monitoring probe installation activities will be performed by a Missouri-licensed well driller supervised by Herst & Associates, Inc. personnel. Approximate locations of the proposed temporary landfill gas perimeter monitoring probes were selected on a 500-foot spacing around the boundaries of Inactive Sanitary Landfill facing Old St. Charles Rock Road in accordance with Missouri regulations concerning perimeter probe spacing provided in Division 80 of Title 10 of the Missouri Code of State Regulations [10 CSR 80-3.010(14)(B)(1)(C)].

Two (2) temporary landfill gas monitoring probe screened intervals (upper and lower) are proposed to be installed at each location to allow monitoring of discrete zones. The upper zone probe at each location will be screened from approximately five (5) feet to approximately twenty (20) feet below ground surface and the lower zone probe at each location will be screened from approximately twenty-five (25) to approximate thirty-five (35) feet below ground surface. **Figure B-1** provides a proposed as-built monitoring diagram of the proposed upper and lower temporary landfill gas perimeter monitoring probe configuration.

Subsequent to installation of the temporary perimeter landfill gas monitoring probes, each probe will be surveyed by a Missouri-licensed surveyor for state-plane Northing, Easting, ground surface elevation, top of protective casing elevation, and top of inner rising elevation. Results of the temporary perimeter landfill gas monitoring probe survey will be provided in the Data Summary Evaluation Report.

Subsequent to completion of temporary perimeter landfill gas monitoring probe installation activities, quarterly measurements for methane will be performed at the installed temporary landfill gas perimeter monitoring probes, as required by 10 CSR 80-3.010(14)(C)(4). Quarterly monitoring of temporary landfill gas monitoring perimeter probes will continue until immediately prior to the commencement Remedial Action construction activities.

Heavy equipment activities are expected to result in severe damage to the temporary probes or the destruction of the temporary probes. Those temporary probes that are identified as requiring decommissioning to facilitate the remedial action will be abandoned in accordance with applicable Missouri regulations prior to initiation of Remedial Action construction activities. Any temporary probes that remain intact through the end of construction activities will be incorporated into the long-term landfill gas monitoring program.

B1.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

The sampling program will include the collection of approximately ninety (90) samples at 150-ft intervals from a surveyed grid across the Inactive Sanitary Landfill to evaluate the existing cover thickness. **Figure A-6** displays the approximate sampling grid and sample locations. This sampling task will be coordinated with the aerial flyover and topographic survey.

After completing the ninety (90) initial sampling locations, thirty (30) Shelby Tube samples will be collected in accordance with ASTM D1587 at locations immediately adjacent to selected sampling locations to further investigate the material properties of the existing cover. Undisturbed soil samples will be collected for material classification and permeability testing purposes.

B1.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

There are no specific sampling process design needs associated with this task.

B1.6 Sampling and Analyses of Selected Groundwater Monitoring Wells

Subsequent to US EPA approval of this RD QAPP, one (1) groundwater monitoring event will be conducted at selected groundwater monitoring wells associated with the Inactive Sanitary Landfill. The groundwater monitoring event is proposed to provide an update to groundwater quality conditions encountered during Remedial Investigation / Feasibility Study (RI / FS) activities. Groundwater samples are proposed to be collected from the following five monitoring wells:

PZ-302-AS, PZ-302AI, PZ-303-AS, PZ-304-AS, PZ-304-AI

The wells were selected to provide groundwater quality results from the same list of wells as included in the 2003 and 2004 supplemental groundwater sampling events near the Inactive Sanitary Landfill. The final list of wells sampled is subject to verification of continued access and appropriate well construction. Locations of monitoring wells proposed for the groundwater monitoring event are provided by **Figure A-8**.

B1.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

As one of the RD tasks, an evaluation will be conducted to further document the history and stability of the existing western slope. A series of thirteen (13) survey pins will be installed in the western slope. The pin locations are displayed in **Figure A-9**. These pins will be surveyed on a monthly basis during the RD phase to document movement and stability of the existing slope.

B2. SAMPLING METHODS

For the West Lake Landfill OU-2 facility, the sampling methods described below are designed to provide defensible, reliable data to assist the decision making process for the Remedial Design.

B2.1 Ground and Aerial Topographic Survey and Base Map Preparation

There is no sampling necessary as part of the ground and aerial topographic survey and base map preparation task.

B2.2 Testing of Potential Borrow Areas

Once the areas of borrow are determined by availability of volume, the representative will coordinate test pits to obtain sufficient samples for geotechnical testing. Samples will be collected and containerized for shipment to a qualified geotechnical testing firm.

B2.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

During installation of the temporary landfill gas perimeter monitoring probes, soils will be collected using plastic sampling sleeves positioned inside the direct-push drilling rods. Upon extraction from the drilling rods, the plastic sleeves will be sliced open and the soils will be logged for lithology and visually inspected for the presence or absence of solid waste. Following installation of the probes, quarterly methane measurements are proposed to be conducted pursuant to the procedures described by the *Technical Bulletin: Sampling of Landfill Gas Monitoring Wells*, dated September 1999, published by the Missouri Department of Natural Resources (**Appendix A**).

B2.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

The sampling program will include the collection of approximately ninety (90) samples at 150-ft intervals from a surveyed grid across the Inactive Sanitary Landfill. **Figure 6-1** displays the approximate sampling grid and sample locations. Each location will be sampled using a

direct push drill rig pushing a tube sampler lined with clear polyethylene liners. Each sampler will be brought to the surface, the liner will be opened, and the soils will be visually examined to distinguish materials and measure corresponding material thicknesses. The field engineer will develop a log of the soil conditions encountered in each soil boring.

After completing the ninety (90) initial sampling locations, thirty (30) Shelby Tube samples will be collected in accordance with ASTM D1587 at locations immediately adjacent to selected sampling locations. Undisturbed soil samples will be collected for material classification and permeability testing purposes. The Shelby Tube samples will be submitted to a qualified testing laboratory where the tubes will be extruded and logged with representative portion of each tube tested for Atterberg Limits, grain size distribution and permeability.

B2.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

No sampling is anticipated for this task.

B2.6 Sampling and Analyses of Selected Groundwater Monitoring Wells

Purging of monitoring wells prior to sampling, collection of groundwater samples, and chain of custody procedures will be conducted in general accordance with the SOPs for Groundwater Sample Collection provided as an attachment to the Sampling and Analysis Plan.

For the project-specific requirements for groundwater sample collection activities at West Lake Landfill OU-2 facility, the following modifications to the SOPs provided as an attachment to the Sampling and Analysis Plan are understood to apply.

- Containerization of purged groundwater and equipment decontamination water is required. Containerized water will be disposed of in leachate Sump K-128, associated with the adjacent closed sanitary landfill.
- Bailer purging and sampling will be performed with disposable Teflon® bailers.
- Required field Quality Control (QC) samples are described in Section B5.3 of this RD QAPP.
- The recommended sample collection order for analyzed groundwater constituents is provided by the following table:

Relative Sensitivity
Of Groundwater Quality Constituents
West Lake Landfill OU-2 Facility

Sample Container Preparation		Analytes
Hydrochloric Acid Preserved †	Decreasing sensitivity ↓	Volatile Organic Compounds
Nitric Acid Preserved		Metals (including Hg and Cations)
Sulfuric Acid Preserved		Phosphorus, Ammonia, and Total Organic Carbon
Non-preserved (Neat)		Semi-Volatile Organic Compounds, Chloride, Fluoride

† Samples to be analyzed for VOCs can be collected in unpreserved containers, but doing so reduces the laboratory holding time from fourteen (14) days to seven (7) days.

B2.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

No sampling is anticipated for this task.

B3. SAMPLE HANDLING AND CUSTODY

B3.1 Ground and Aerial Topographic Survey and Base Map Preparation

There are no sample handling and custody issues associated with the ground and aerial topographic survey and base map preparation task.

B3.2 Testing of Potential Borrow Areas

Since samples for geotechnical testing are disturbed samples, sample handling will involve preservation of the initial quantity of sample by sealing the container properly. A soils testing request form will be attached to each container including the date of sampling, the location of the sampling, the sampler's name, a general description of the material, and the requested tests to be conducted. A copy of the soils testing request form will be kept by the Landfill Design Manager.

B3.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

Neither visual inspections of soil samples collected in plastic sleeves nor quarterly methane measurements will result in collection of samples for laboratory analysis. Accordingly, sample handling and custody requirements are not expected to apply to landfill gas perimeter probe installations and measurements.

B3.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

Soil samples collected specifically for determining material thicknesses will be measured and documented on-site. Since these samples will not be submitted for any further off-site analysis, no additional sample handling or custody procedures are applicable.

For the portion of soil samples being collected for off-site geotechnical analysis, sample handling will involve preservation of the sample by proper sealing of the container. A soil testing request form will be attached to each container including the sampling date, location, sampler's name, a general description of the material, and the requested laboratory analyses. A copy of the soil testing request form will be retained by the Landfill Design Manager.

B3.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

There are no sample handling and custody issues associated with this task.

B3.6 Sampling and Analysis of Selected Groundwater Monitoring Wells

The groundwater sample handling and custody procedures provided in the Sampling and Analysis Plan will be followed for samples collected from monitoring wells at the West Lake Landfill OU-2 facility.

B3.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

There are no sample handling and custody issues associated with this task.

B4. ANALYTICAL METHODS

B4.1 Ground and Aerial Topographic Survey and Base Map Preparation

There are no analytical methods associated with the ground and aerial topographic survey and base map preparation task.

B4.2 Testing of Potential Borrow Areas

The following test methods will be employed for geotechnical testing:

- Moisture-Density relationships using the Standard Proctor Method - ASTM D698
- Grain size distribution – ASTM D421, D422 and D1140
- Atterberg Limits – ASTM 4318
- Permeability (recompacted to specified density) – ASTM 5084

B4.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

Neither visual inspections of soil samples collected in plastic sleeves nor quarterly methane measurements will result in collection of samples for laboratory analysis. Accordingly, analytical methods are not expected to apply to landfill gas perimeter probe installations and measurements.

B4.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

The following analytical methods will be employed for geotechnical testing of the Shelby Tube samples:

- Moisture Content – ASTM D2216
- Unit Weight – ASTM D2166
- Grain size distribution – ASTM D421, D422, and D1140
- Atterberg Limits – ASTM 4318
- Permeability – ASTM 5084

B4.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

There are no analytical methods associated with this task.

B4.6 Sampling and Analysis of Selected Groundwater Monitoring Wells

Collected groundwater samples will be analyzed by the laboratory for:

- Volatile Organic Compounds by SW-846 Method 8260B;
- Semivolatile Organic Compounds by SW-846 Method 8270C;
- Total Metals by SW-846 Method 6010C;
- Total Mercury by SW-846 Method 7470A;
- Chloride and Fluoride by EPA Method 300.0;
- Total Phosphorus by EPA Method 365.2;
- Ammonia (Nitrogen) by EPA Method 350.1;

A copy of the analytical laboratory Statement of Qualifications provided by TestAmerica, Inc. is provided in **Appendix B**.

B4.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

Slope stability measurements will not result in the collection of any samples for laboratory analysis. As a result, there are no analytical methods associated with this task.

B5. QUALITY CONTROL

B5.1 Ground and Aerial Topographic Survey and Base Map Preparation

There are no sample quality control issues associated with the ground and aerial topographic survey and base map preparation task.

B5.2 Testing of Potential Borrow Areas

Geotechnical testing will be conducted by a certified laboratory. Certification must be approved by the Department of Transportation from the state where the laboratory is located or similar level of authority or credentials.

B5.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

Neither visual inspections of soil samples collected in plastic sleeves nor quarterly methane measurements will result in collection of samples for laboratory analysis. Accordingly, sample quality control issues are not expected to be associated with the landfill gas perimeter probe installations and measurements.

B5.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

Geotechnical testing will be conducted by a certified laboratory. Certification must be approved by the Department of Transportation from the state where the laboratory is located or similar level of authority or credentials.

B5.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

There are no sample quality control issues associated with this task.

B5.6 Sampling and Analyses of Selected Groundwater Monitoring Wells

The following field Quality Control samples and sample frequencies will be collected for analysis during the proposed groundwater monitoring event:

- Field Duplicate samples – one (1) field duplicate soil sample to be collected per ten (10) primary soil samples.
- Field (Atmospheric) Blank samples – one (1) field blank sample to be collected per monitoring event.
- Equipment Blank samples – one (1) equipment blank sample to be collected per monitoring event if a non-dedicated pump is utilized for purging and sampling.\
- Trip Blank samples – one (1) trip blank sample (provided by the laboratory) to be included with each sample shipment containing samples for analysis of VOCs.

The following laboratory Quality Control samples and sample frequencies are proposed to be analyzed concurrently with groundwater samples:

- Method Blank samples – one (1) method blank sample to be analyzed per twenty (20) samples analyzed in the batch;
- Laboratory Control Samples (LCS) – one (1) LCS to be analyzed per twenty (20) samples analyzed in the batch; and
- Matrix Spike / Matrix Spike Duplicate (MS / MSD) samples – one (1) MS / MSD sample pair to be analyzed per twenty (20) samples analyzed in the batch.

B5.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

Data must be collected using calibrated equipment that exceeds the industry standard. This data must also be provided as a document that is signed and sealed by a licensed surveyor in the State of Missouri.

B6. INSTRUMENT / EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

Field instruments (e.g. pH meters, Specific Conductance meters, water level indicators, gamma detectors, etc.) used for groundwater monitoring and health and safety monitoring will be tested, inspected, and maintained according to manufacturer's recommendations.

B7. INSTRUMENT / EQUIPMENT CALIBRATION AND FREQUENCY

Field instrumentation utilized for groundwater purging measurements (pH meters, Specific Conductance meters, and Turbidity meters) and landfill gas measurements will be calibrated according to the manufacturers' recommendations each day of sampling and prior to monitoring activities. The calibration of field instrumentation will be verified at the end of each sampling day against the calibration solutions or calibration gases. If potentially anomalous field parameter measurements are encountered during groundwater sampling or gas monitoring activities, the calibration frequency may be increased at the discretion of the field sampling crew to confirm potentially anomalous measurements.

B8. INSPECTION / ACCEPTANCE OF SUPPLIES AND CONSUMABLES

Supplies and consumables for the activities described by this RD QAPP are described below.

B8.1 Ground and Aerial Topographic Survey and Base Map Preparation

The inspection and acceptance of supplies and consumables are not expected to be associated with the ground and aerial topographic survey and base map preparation task.

B8.2 Testing of Potential Borrow Areas

There will be no need for acceptance of supplies and consumables for this task.

B8.3 Installation and Monitoring of Temporary Landfill Gas Perimeter Monitoring Probes

Required supplies and consumables for temporary landfill gas perimeter monitoring probe installation activities are expected to consist of environmental-grade one (1)-inch diameter PVC riser and screen, steel protective casings, locks, bentonite chips, bentonite/cement grout, etc. utilized by the drilling contractor to construct the probes. Required supplies and consumables for quarterly temporary landfill gas perimeter probe monitoring activities are expected to consist of calibration gases for the combustible gas indicator.

B8.4 Existing Thickness and Material Evaluation of Inactive Sanitary Landfill Cover

There will be no need for acceptance of supplies and consumables for this task.

B8.5 Evaluation of Stormwater Conveyance and Leachate Pumping Well Structures

There will be no need for acceptance of supplies and consumables for this task.

B8.6 Sampling and Analyses of Selected Groundwater Monitoring Wells

Required supplies and consumables for groundwater monitoring activities are expected to consist of:

- Disposable Teflon® bailers;
- Disposable polyethylene / nylon rope;
- Groundwater sample containers provided by the laboratory;
- Calibration solutions for field pH, Specific Conductance, and Turbidity meters;
- LiquiNox® (or equivalent) detergent for equipment decontamination between monitoring wells;
- Deionized water for equipment decontamination between monitoring wells;
- Deionized water for field blank and / or equipment blank collection;
- Disposable gloves;
- Paper towels; and
- Ice for maintaining cooled samples prior to delivery to the analytical laboratory.

B8.7 Slope Stability Verification along Western Portion of the Inactive Sanitary Landfill

There will be no need for acceptance of supplies and consumables for this task.

B9. NON-DIRECT MEASUREMENTS

Previous information obtained during field activities for the West Lake Landfill OU-2 facility may be used for planning field activities proposed in this RD QAPP. For example, monitoring well analytical results from previous sampling events will be used to determine the order of monitoring well purging and sampling (from least impacted to most impacted).

C1. REPORTS TO MANAGEMENT

Information gathered as part of the RD phase activities will be provided to USEPA and MDNR through two primary means – Monthly Reports and the Data Evaluation Summary Report. Monthly reports will include as attachments copies of raw data provided by the analytical laboratory. The Data Evaluation Summary Report will include evaluations of the collected data as well as copies of field documentation sheets, data, validation results, etc.

D1. DATA REVIEW, VERIFICATION, AND VALIDATION

All laboratory analytical results for groundwater samples and soil samples will be validated in accordance with the requirements of a Level 4 validation program. Components of the Level 4 data validation program are provided in Section D.2.

D2. VERIFICATION AND VALIDATION METHODS

Level 4 data validation will be performed in general accordance with the USEPA National Functional Guidelines for Inorganic Data Review (revised October 2004), USEPA National Functional Guidelines for Organic Data Review (revised October 1999), and the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, (Final, June 2007).

Elements of the Level 4 data validation program are expected to consist of:

For Organic Analyses:

- Holding Times;
- Initial Calibration Procedures and Results;
- Continuing Calibration Procedures and Results;
- Blank Results;
- System Monitoring Compound (Surrogate) Recoveries;
- Matrix Spike and Matrix Spike Duplicate Recoveries;
- Laboratory Control Sample Recoveries;
- Internal Standard Performance;
- Field Duplicate Sample Analysis – Relative Percent Difference (RPD);
- Laboratory Duplicate Sample Analysis – Relative Percent Difference (RPD);
- Compound Quantitation;
- Transcriptions from Raw Data to Summary Forms;
- Reporting Limits; and
- Overall Assessment of Data in the Sample Delivery Group (SDG)

For Inorganic Analyses:

- Holding Times;
- Initial Calibration Procedures and Results;
- Continuing Calibration Procedures and Results;
- Blank Results;
- System Monitoring Compound (Surrogate) Recoveries;
- Matrix Spike and Matrix Spike Duplicate Recoveries;
- Laboratory Control Sample Recoveries;
- ICP Interference Check Sample Results;
- MSA and Serial Dilution Check Results;
- Field Duplicate Sample Analysis – Relative Percent Difference (RPD);

- Laboratory Duplicate Sample Analysis – Relative Percent Difference (RPD);
- Compound Quantitation;
- Transcriptions from Raw Data to Summary Forms;
- Reporting Limits; and
- Overall Assessment of Data in the Sample Delivery Group (SDG)

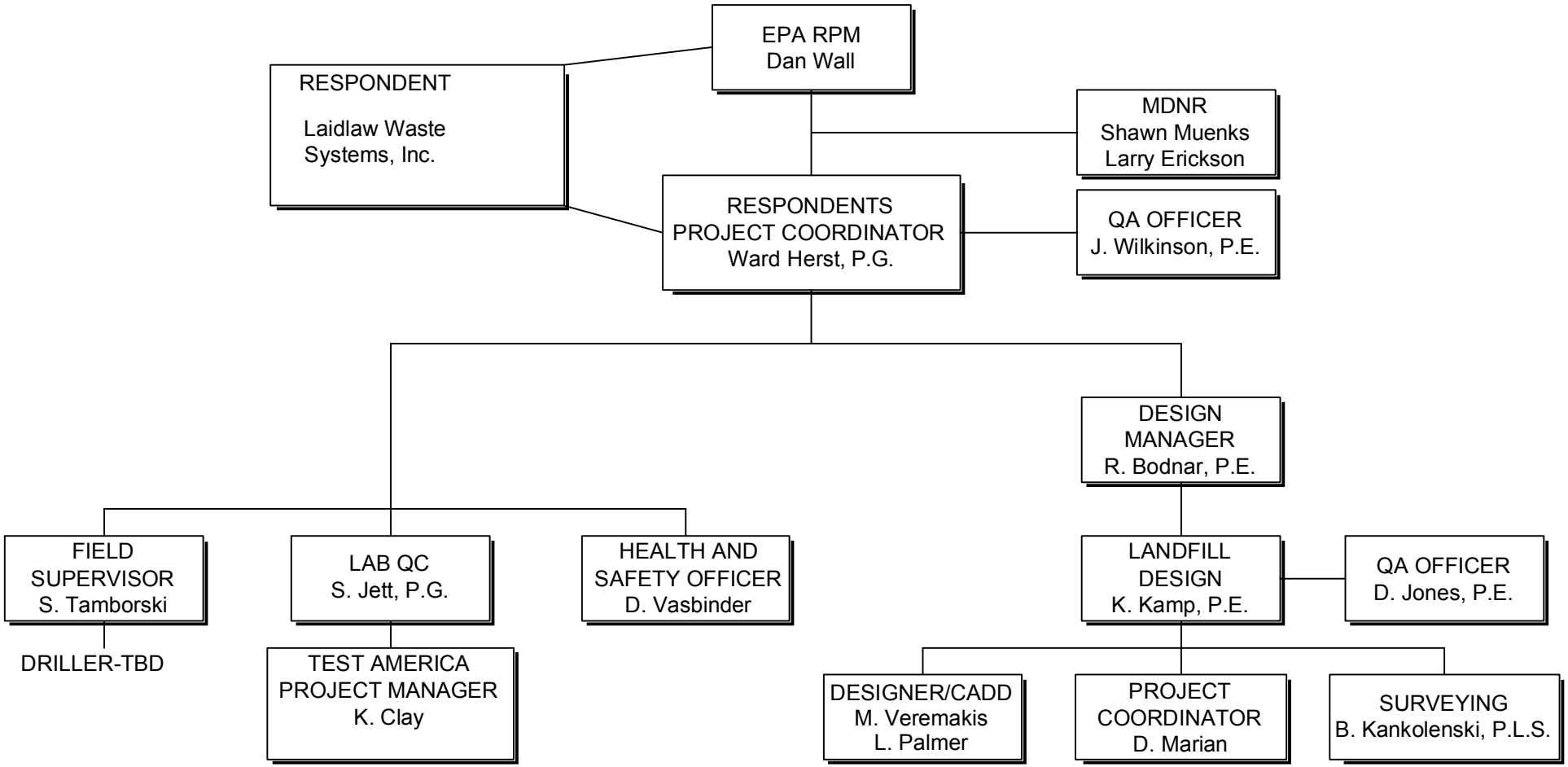
Level 4 data validation summary reports will be provided to the US EPA and the MDNR. Each validation summary report will provide a discussion of validation methods, validated analytical results, and an assessment of data accuracy, data precision, and data completeness.

TABLES

Table A-1
RD QAPP Project Personnel Contact Information
West Lake Landfill OU-2 Facility
Bridgeton, Missouri

Name	Affiliation	Title	Mailing Street Address	City, State, ZIP Code	Telephone Number
Ward Herst	Herst & Associates, Inc.	Respondencts Project Coordinator	4630 S Hwy 94 - N Outer Road	St. Charles, MO 63304	(636) 939-9111
Jonathan Wilkinson	Herst & Associates, Inc.	QA Officer	4630 S Hwy 94 - N Outer Road	St. Charles, MO 63304	(636) 939-9111
Shane Tamborski	Herst & Associates, Inc.	Field Supervisor	4630 S Hwy 94 - N Outer Road	St. Charles, MO 63304	(636) 939-9111
David Vasbinder	Herst & Associates, Inc.	Health and Safety Officer	4630 S Hwy 94 - N Outer Road	St. Charles, MO 63304	(636) 939-9111
Steven Jett	Herst & Associates, Inc.	Lab QC	4630 S Hwy 94 - N Outer Road	St. Charles, MO 63304	(636) 939-9111
Randal Bodnar	Civil & Environmental Consultants, Inc.	Design Manager	11811 N Tatum Blvd, Suite 3031	Phoenix, AZ 85032	(602) 953-7718
Kevin Kamp	Civil & Environmental Consultants, Inc.	Landfill Designer	4848 Park 370 Boulevard, Suite F	Hazelwood, MO 63042	(314) 656-4566
Doug Marian	Civil & Environmental Consultants, Inc.	Environmental Engineer	4848 Park 370 Boulevard, Suite F	Hazelwood, MO 63042	(314) 656-4566
William Kankolenski	Civil & Environmental Consultants, Inc.	Lead Surveyor	4848 Park 370 Boulevard, Suite F	Hazelwood, MO 63042	(314) 656-4566
K. Clay	Test America	Project Manager	13715 Rider Trail North	Earth City, MO 63045	(314) 298-8566

FIGURES



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St. Charles, Missouri 63304
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Fax (636) 939-9757
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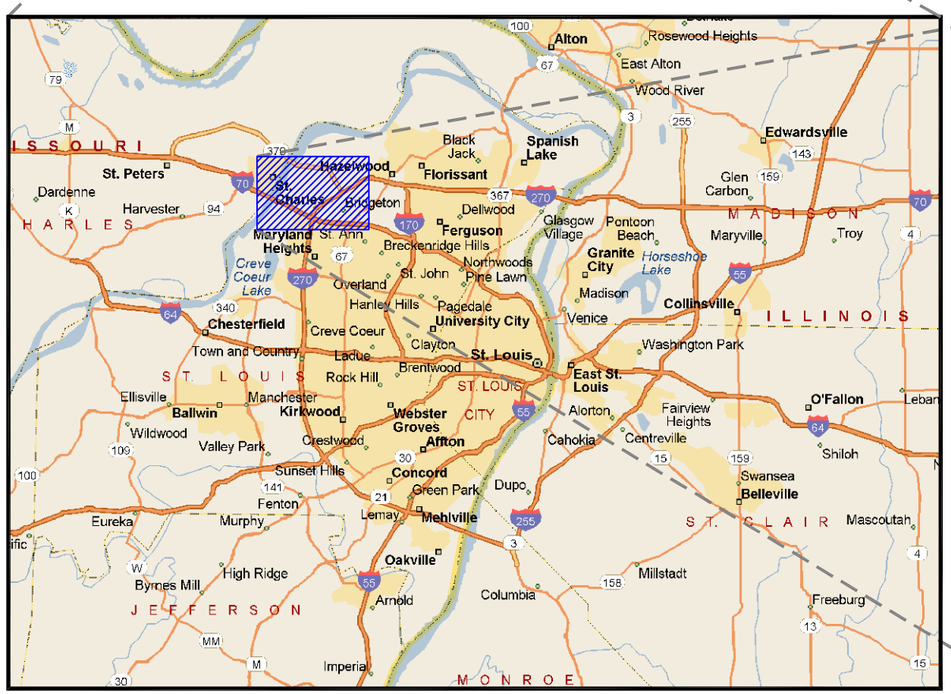
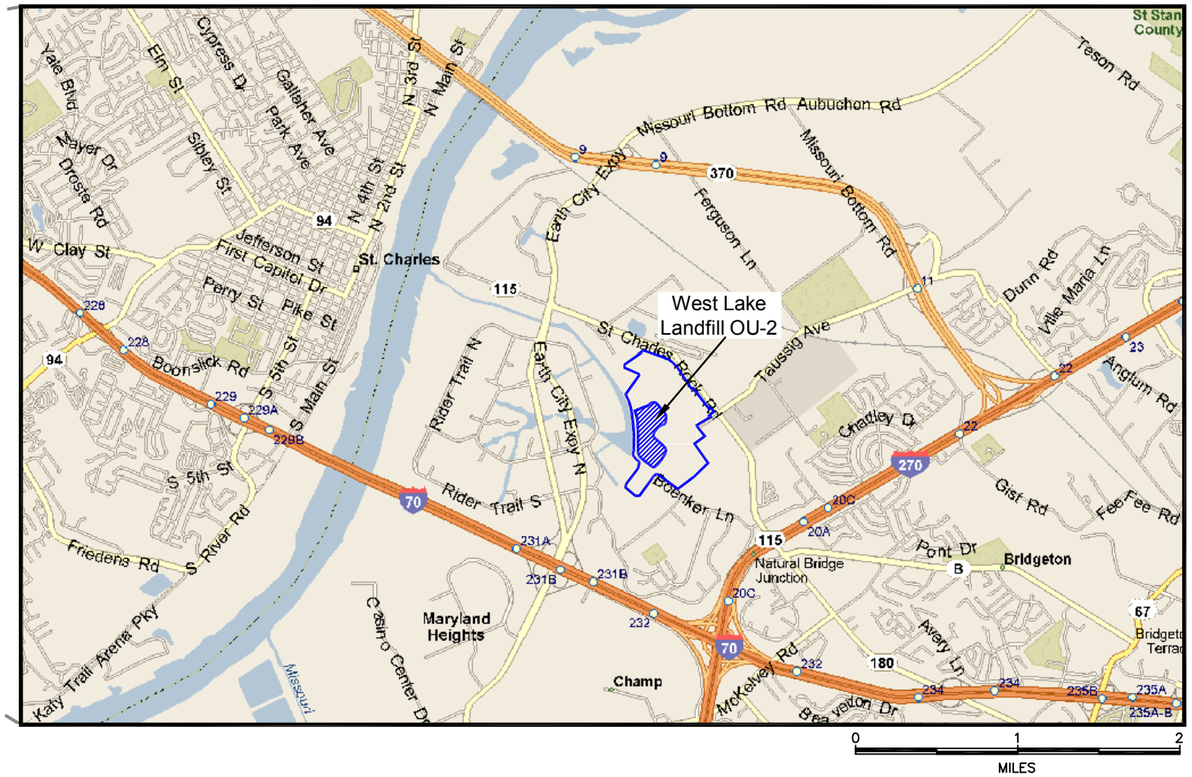
West Lake Landfill OU-2
Bridgeton, Missouri

Figure A-1
Project Organization Chart

NORTH

Maps courtesy of Microsoft Streets and Trips 2005





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West Lake Landfill OU-2
Bridgeton, Missouri

Figure A-2
Site Location Map

LEGEND

- Monitoring Well
- Gas Probe
- Leachate Riser
- Leachate Sump
- Presumably Destroyed Well
- Approximate Operable Unit 2 Boundary
- Leachate Outfall
- NPDES Outfall

NPDES and Leachate Outfalls are associated with the Former Active Sanitary Landfill

NORTH

0 100 200 350 500 700

Scale in Feet
Graphic Scale: 1 inch = 350 feet

PZ-100-SS
PZ-100-SD
PZ-100-KS
PZ-208-SS
GMP-8
GMP-7
PZ-200-SS
NPDES Outfall 006
PZ-114-AS
PZ-115-SS
PZ-102-SS
PZ-102R-SS
PZ-201A-SS
GMP-6
PZ-202-SS
GMP-5
PZ-1201-SS
PZ-104-SS
PZ-104-SD
PZ-104-KS
PZ-103-SS
LCS-3C
PZ-203-SS
GMP-4
I-68
PZ-101-SS
Operable Unit 1
Area 1
D-14
LCS-6A
LCS-5A
S-84
D-85
LCS-1B
LCS-2C
Former Active Sanitary Landfill
Permit No. 118912
I-67
ENTRANCE STATION
NPDES Outfall 001
PZ-207-AS
PZ-109-SS
PZ-105-SS
GMP-3
GMP-13
NPDES Outfall 005
S-5
I-4
D-3
PZ-108-SS
CONCRETE PLANT
PZ-110-SS
MW-F1-S
PZ-111-SD
PZ-111-KS
MW-F1-D
PZ-206-SS
PZ-116-SS
MW-1204
GMP-12
I-66
MW-F3
PZ-113-AS
PZ-113-AD
PZ-113-SS
PZ-112-AS
LCS-4A
GMP-11
Closed Demolition Landfill
LR-104
PZ-305-AI
I-73
LCS-128K
GMP-2
PZ-204-SS
PZ-204A-SS
D-13
MW-5A
MW-4A
MW-1A
MW-3A
MW-2A
PZ-205-AS
PZ-205-SS
PZ-106-SD
PZ-106-SS
PZ-106-KS
GMP-10
I-65
D-87
ASPI PLANT
LR-103
S-88
PZ-107-SS
GMP-1
Leachate Outfall 008
GMP-9
NPDES Outfall 003
D-12
S-10
I-11
Operable Unit 1
Area 2
Operable Unit 2
Inactive Sanitary Landfill
LR-100
LR-102
LR-101
S-75
PZ-302-AS
PZ-302-AI
S-8
I-62
D-83
S-61
D-6
MW-102
LR-105
PZ-304-AS
PZ-304-AI
PZ-303-AS
MW-F2
D-81
Former Leachate Pond
S-53
MW-101
I-7
MW-103
MW-104
S-82
D-93
I-9
I-2
S-1
S-51
S-52

Date of Aerial Topography January 20, 2005, basemap provided by Sanborn.

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West Lake Landfill OU-2
Bridgeton, Missouri

Figure A-3
Existing Facility Features Map

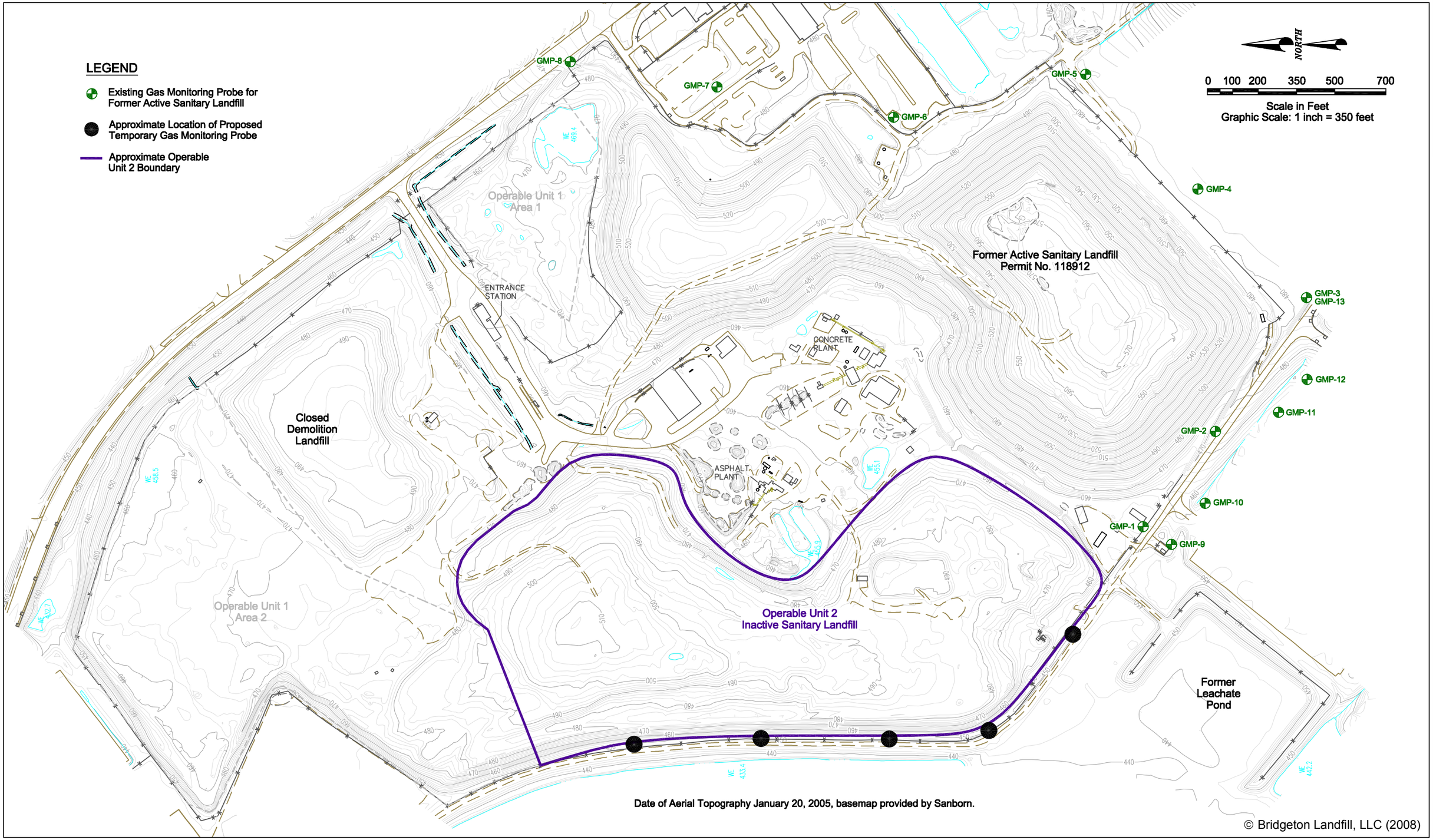

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Figure A-4
Approximate Locations of Proposed Temporary Landfill Gas Perimeter Monitoring Probes

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NORTH

SCALE IN FEET

0 400 800

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BRIDGETON, MO 63044
ST. LOUIS COUNTY

LOCATIONS OF POTENTIAL BORROW AREAS

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:	A-5
DATE:	DEC. 2008	DWG SCALE:	1"=400'	PROJECT NO:	081-926		

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CS-1* CS-2 CS-3* CS-4 CS-5*
CS-6* CS-7 CS-8 CS-9 CS-10* CS-11
CS-12 CS-13 CS-14* CS-15 CS-16 CS-17* CS-18
CS-19 CS-20* CS-21 CS-22 CS-23* CS-24 CS-25*
CS-26* CS-27 CS-28 CS-29* CS-30 CS-31* CS-32
CS-33 CS-34* CS-35 CS-36 CS-37* CS-38
CS-39* CS-40 CS-41 CS-42 CS-43
CS-44 CS-45* CS-46 CS-47*
CS-48* CS-49 CS-50 CS-51
CS-52 CS-53* CS-54 CS-55* CS-56 CS-57*
CS-58 CS-59 CS-60 CS-61 CS-62 CS-63 CS-64
CS-65* CS-66 CS-67* CS-68 CS-69 CS-70* CS-71
CS-72 CS-73 CS-74 CS-75 CS-76* CS-77 CS-78
CS-79* CS-80 CS-81* CS-82 CS-83 CS-84*
CS-85 CS-86 CS-87 CS-88
CS-89* CS-90

LEGEND

OU-2 BOUNDARY

COVER SAMPLING LOCATIONS CS-25

EX. LEACHATE WELL & PUMP

EX. CONC. STAND PIPE

* SHELBY TUBE SAMPLES

NORTH

SCALE IN FEET

0 200 400

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PROPOSED SAMPLING GRID FOR THICKNESS EVALUATION OF INACTIVE LANDFILL COVER

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:	A-6
DATE:	DEC. 2008	DWG SCALE:	1"=200'	PROJECT NO:	081-926		

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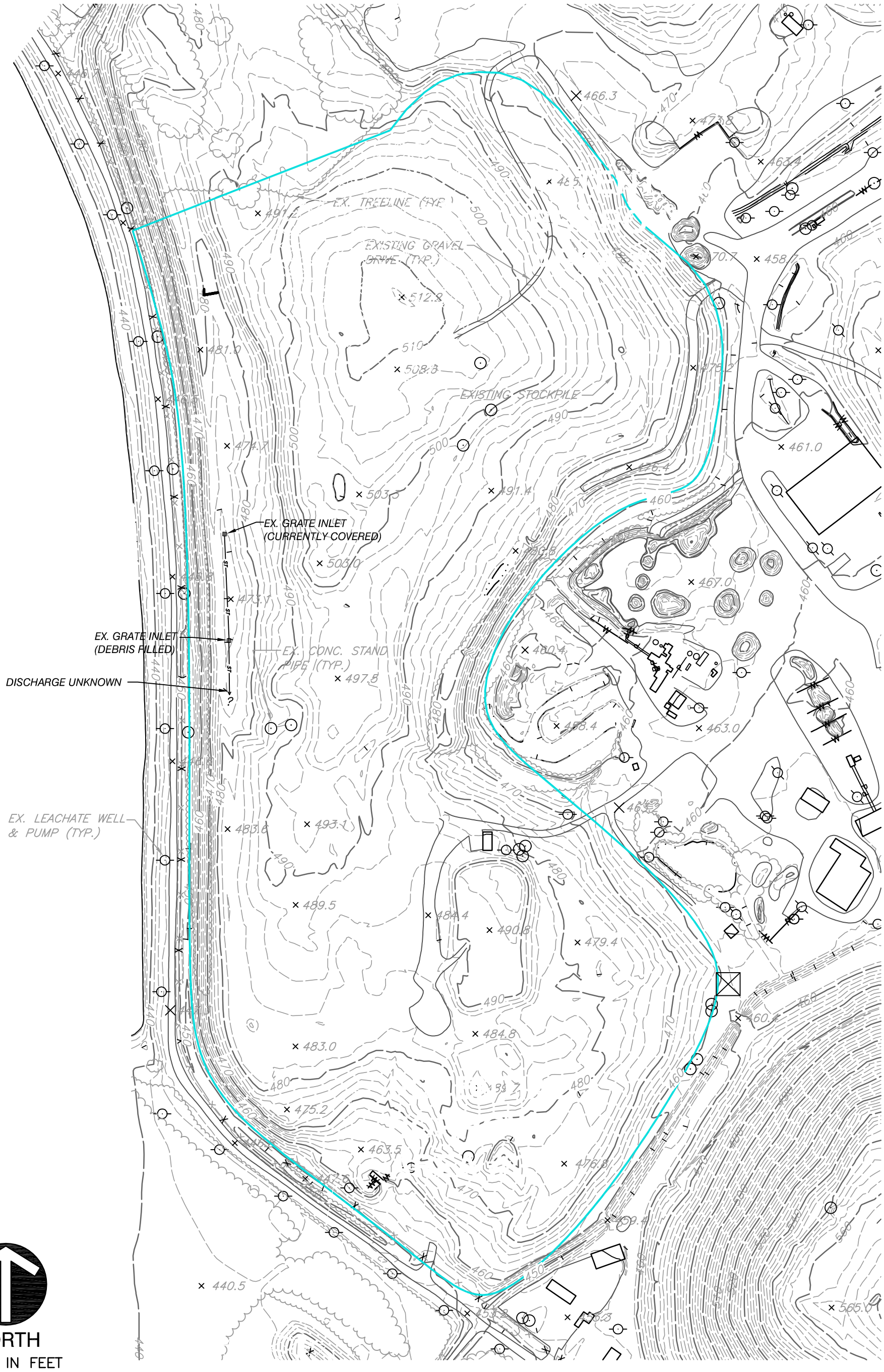

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ST. LOUIS COUNTY

LOCATIONS OF EXISTING STORWATER CONVEYANCE STRUCTURES

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:	A-7
DATE:	DEC. 2008	DWG SCALE:	1"=200'	PROJECT NO:	081-926		

LEGEND

- Proposed Groundwater Monitoring Well for Single Monitoring Event
- Monitoring Well (not used for monitoring event)
- Gas Probe
- Leachate Riser
- Leachate Sump
- Presumably Destroyed Well
- Approximate Operable Unit 2 Boundary

NORTH

0 100 200 350 500 700

Scale in Feet
Graphic Scale: 1 inch = 350 feet

PZ-208-SS
GMP-8
PZ-100-SS
PZ-100-SD
PZ-100-KS
GMP-7
PZ-200-SS
PZ-202-SS
GMP-5
PZ-114-AS
PZ-115-SS
PZ-102-SS
PZ-102R-SS
PZ-201A-SS
GMP-6
PZ-1201-SS
PZ-104-SS
PZ-104-SD
PZ-104-KS
I-68
PZ-101-SS
PZ-103-SS
LCS-3C
PZ-203-SS
GMP-4
Operable Unit 1
Area 1
D-14
LCS-6A
LCS-5A
S-84
D-85
LCS-1B
LCS-2C
Former Active Sanitary Landfill
Permit No. 118912
I-67
ENTRANCE
STATION
PZ-109-SS
PZ-105-SS
GMP-3
GMP-13
PZ-207-AS
PZ-108-SS
CONCRETE
PLANT
S-5
I-4
D-3
PZ-110-SS
MW-F1-S
I-66
MW-F3
PZ-111-SD
PZ-111-KS
MW-F1-D
PZ-206-SS
PZ-116-SS
MW-1204
GMP-12
PZ-113-AS
PZ-113-AD
PZ-113-SS
PZ-112-AS
LCS-4A
GMP-11
Closed
Demolition
Landfill
LR-104
PZ-305-AI
I-73
LCS-128K
GMP-2
PZ-204-SS
PZ-204A-SS
D-13
ASPH
PLAN
MW-4A
MW-3A
MW-5A
MW-1A
MW-2A
PZ-205-AS
PZ-205-SS
PZ-106-SD
PZ-106-SS
PZ-106-KS
GMP-10
D-87
LR-103
S-88
PZ-107-SS
GMP-1
GMP-9
I-65
Operable Unit 1
Area 2
D-12
S-10
I-11
Operable Unit 2
Inactive Sanitary Landfill
LR-100
LR-102
LR-101
PZ-302-AS
PZ-302-AI
S-75
S-8
I-62
D-83
S-61
D-6
MW-102
Former
Leachate
Pond
LR-105
S-53
MW-101
I-7
PZ-304-AS
PZ-304-AI
PZ-303-AS
MW-F2
D-81
MW-103
MW-104
D-93
S-82
I-9
I-2
S-1
S-51
S-52

Date of Aerial Topography January 20, 2005, basemap provided by Sanborn.

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Figure A-8
Locations of Groundwater Monitoring Wells Proposed for Single Monitoring Event

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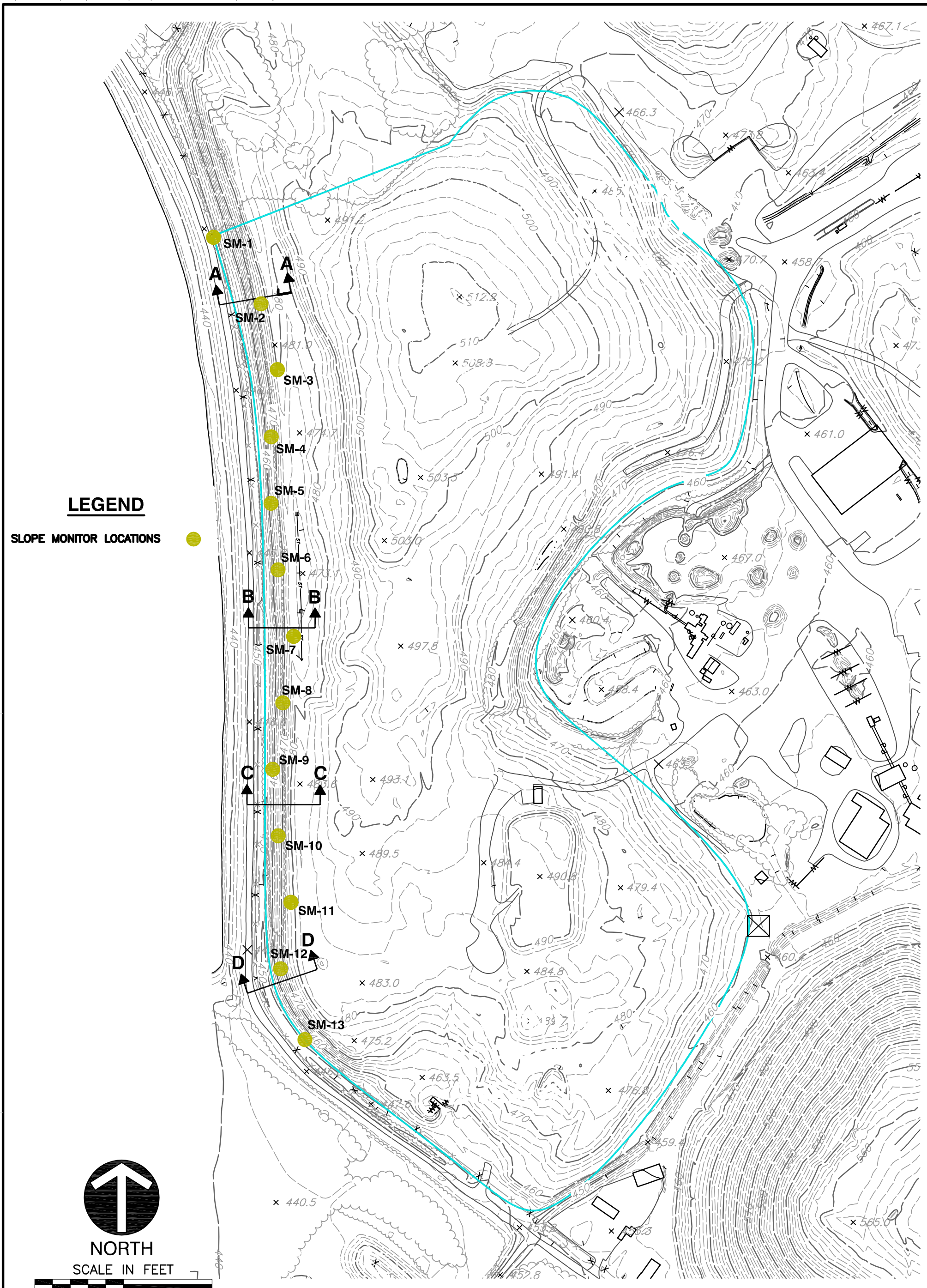

LEGEND

SLOPE MONITOR LOCATIONS

NORTH

SCALE IN FEET

0 200 400

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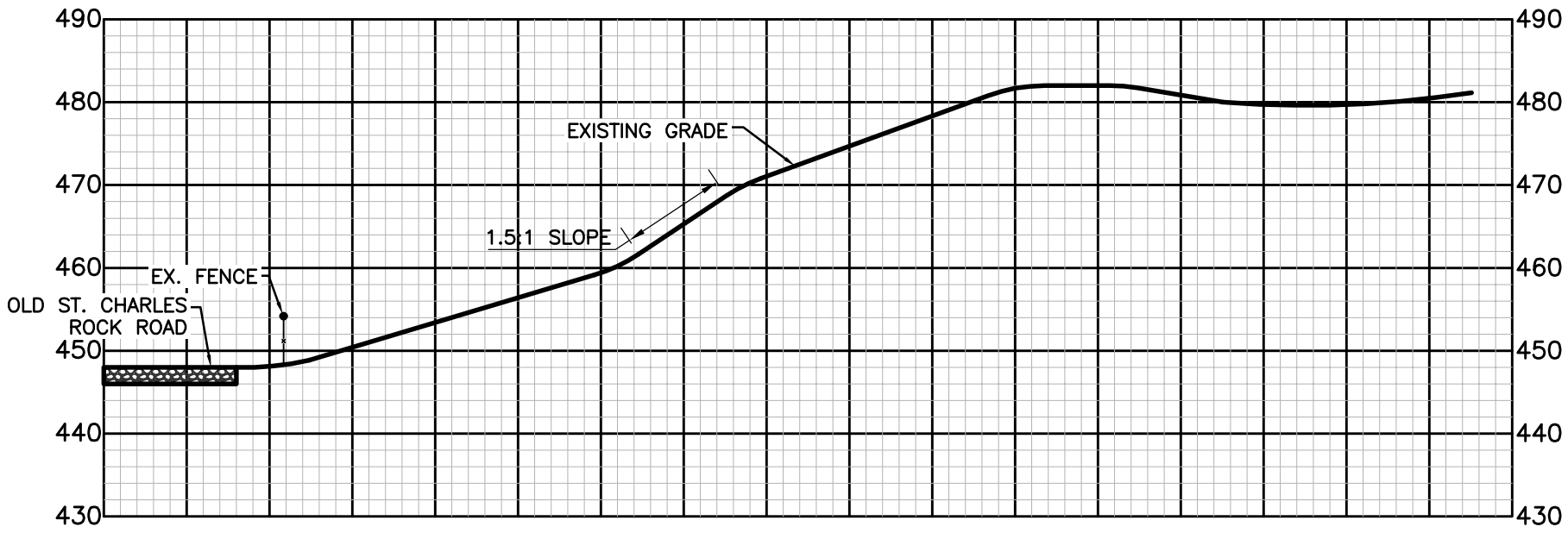
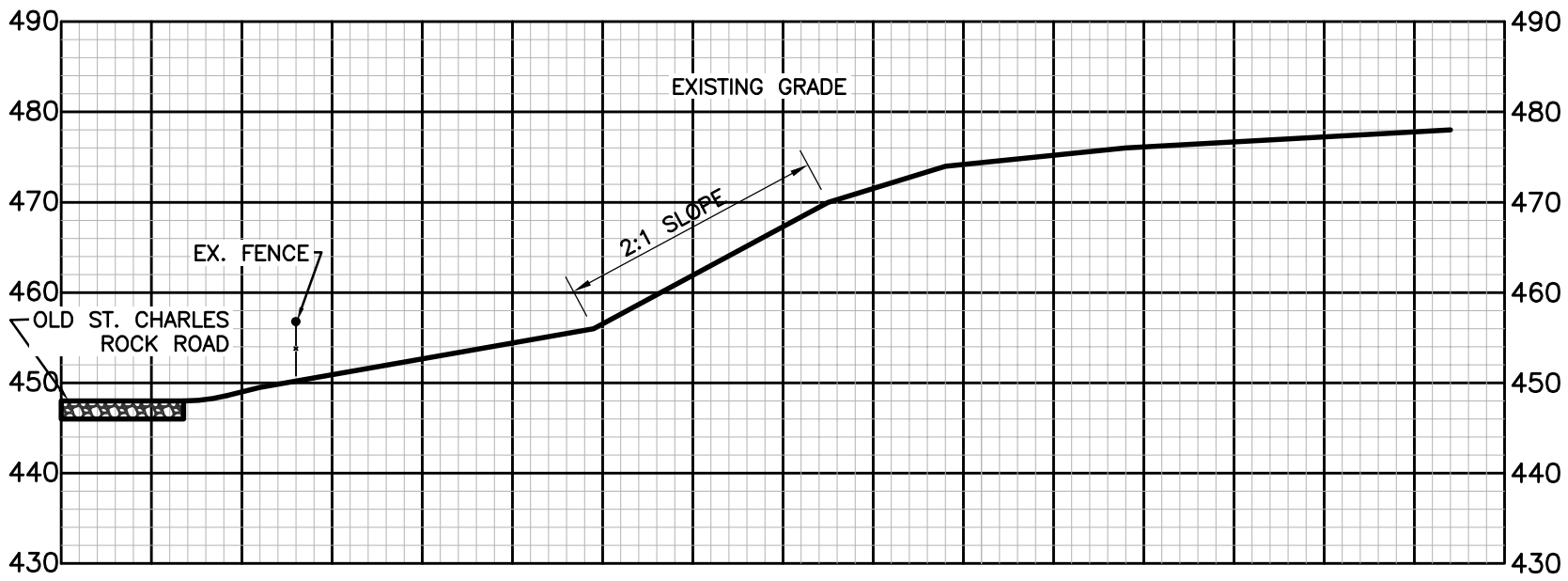
ST. LOUIS COUNTY

EXISTING WESTERN SLOPE OF OU-2

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:
DATE:	DEC. 2008	DWG SCALE:	1"=200'	PROJECT NO:	081-926	A-9a



SECTION A-A



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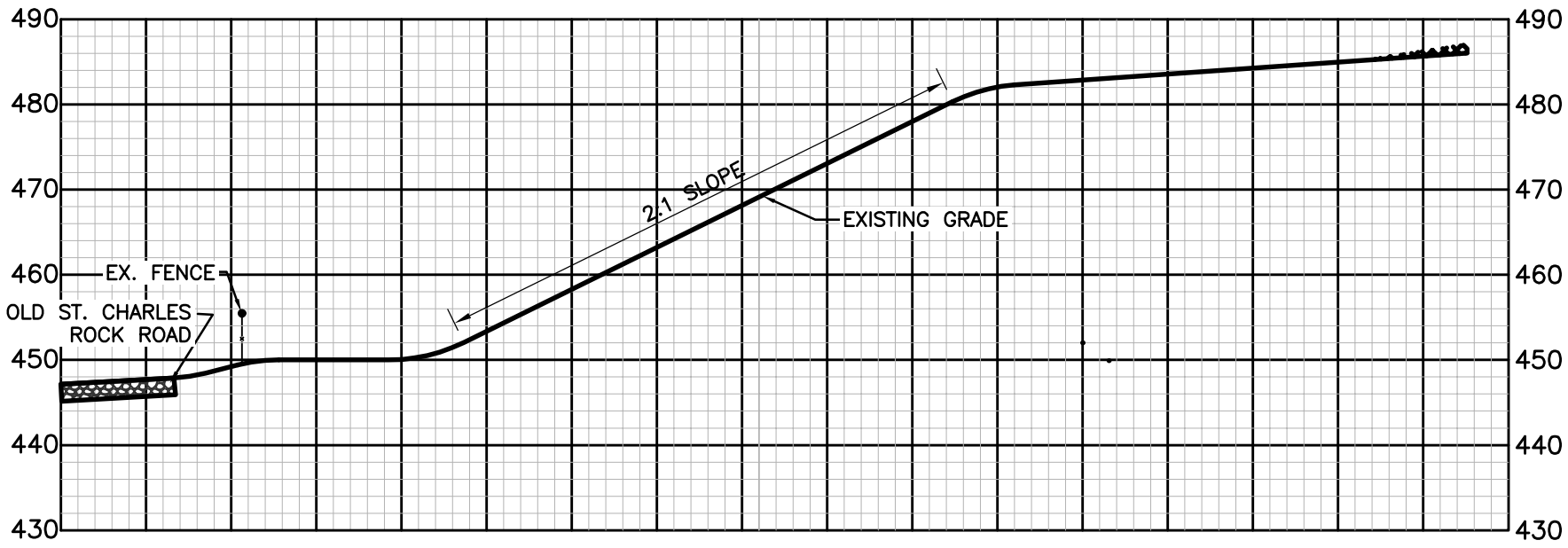
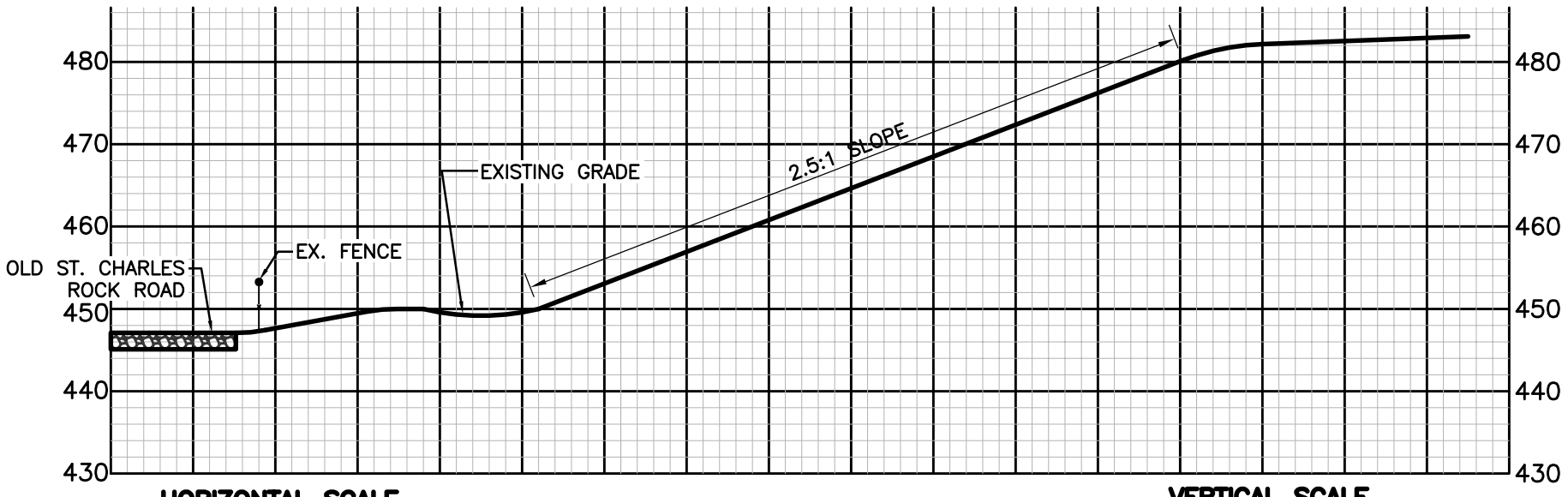


SECTION C-C



HORIZONTAL SCALE
SCALE IN FEET
0 20 40

SECTION D-D

VERTICAL SCALE
SCALE IN FEET
0 20 40

PREPARED IN CONJUCTION WITH

HERST & ASSOCIATES, INC.®

Civil & Environmental Consultants, Inc.
4848 Park 370 Blvd., Suite F - Hazelwood, MO 63042
314-656-4566 · 866-250-3679
www.cecinc.com

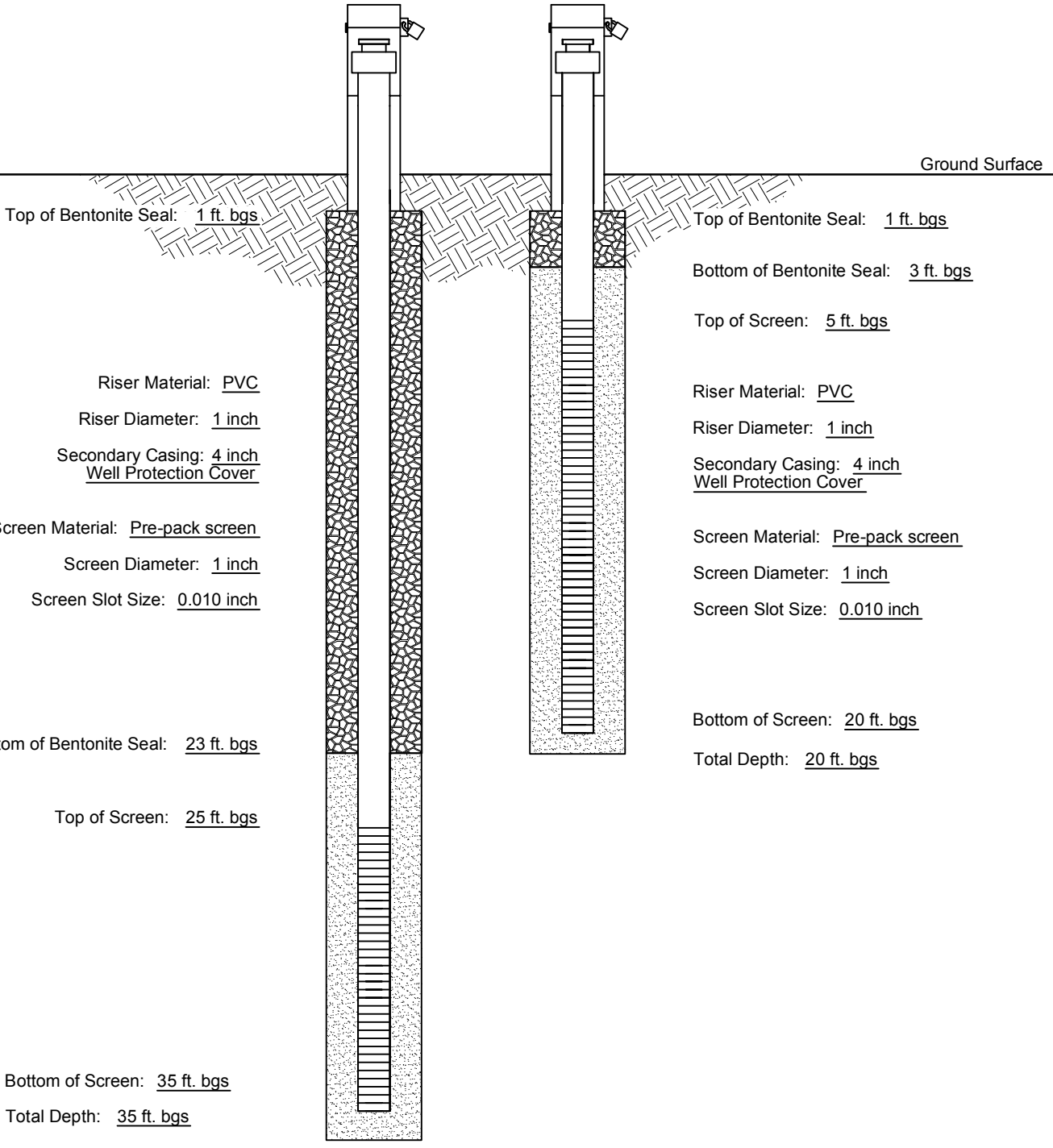
WESTLAKE LANDFILL OU-2
13570 ST. CHARLES ROCK ROAD
BRIDGETON, MO 63044
ST. LOUIS COUNTY

WESTERN SLOPE SECTIONS OF OU-2

DRAWN BY:	LEP	CHECKED BY:	KTK	APPROVED BY:	*DFM	FIGURE NO.:	A-9b
DATE:	DEC. 2008	DWG SCALE:	1"=20'	PROJECT NO:	081-926		

Drilling Contractor: _____
Driller: _____
Helper: _____
Drilling Method: Direct Push
Surveyor: _____

Consulting Firm: Herst & Associates, Inc.
Installation Supervisor: _____
Registered Professional Geologist: _____
Date Started: _____
Date Completed: _____
Northing: _____ Easting: _____



(Not to Scale)

4630 South Highway 94
North Outer Road
St. Charles, Missouri 63304
Phone (636) 939-9111
Fax (636) 939-9757
HERST & ASSOCIATES, INC.®

West Lake Landfill OU-2
Bridgeton, Missouri

Figure B-1
Example of Temporary Gas Probe Construction

APPENDIX A

MDNR Technical Bulletin: Sampling of Landfill Gas Monitoring Wells

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Sampling of Landfill Gas Monitoring Wells

Technical Bulletin
9/1999

Division of Environmental Quality
Solid Waste Management Program

Overview

This document was prepared by the Missouri Department of Natural Resources' Solid Waste Management Program (SWMP) to provide guidance regarding the quarterly sampling of gas monitoring wells as required by 10 CSR 80-3.010(14) and 10 CSR 80-4.010(14). This guidance applies to all landfills that monitor for methane migration by means of gas monitoring wells. Sampling results must be submitted at least quarterly to SWMP in an electronic format.

Sampling Equipment

Proper selection of sampling equipment is critical in obtaining true soil gas concentrations. Explosimeter-type instruments are not appropriate for measuring methane in gas monitoring wells, because the amount of oxygen which is present in the well may not be sufficient for the sample to "burn." These instruments will typically give false low readings when high concentrations of methane are present.

It is recommended that instruments used to sample gas monitoring wells have an automatic pump that has the ability to withdraw enough volume to bring a fresh sample of soil gas into the well. It is also beneficial that the instrument reads both oxygen and methane concentrations. Some instruments have the ability to read barometric pressure, which is also desirable.

Sampling Procedures

Step 1 - Make sure the instrument is properly calibrated. Prepare the instrument for sampling by allowing it to properly warm up as directed by the manufacturer.

Step 2 - Connect the instrument to the well head and begin collecting a sample.

Step 3 - Continue collecting the sample until the reading stabilizes. A stable reading is one that does not vary more than 0.5 percent by volume on the instrument's scale.

Step 4 - A proper reading should have 2 percent oxygen by volume or less. If levels of oxygen are higher, it may indicate that air is being drawn into the system giving a false reading of the true soil gas concentrations. Possible explanations for this problem are:

A. The gas monitoring well seal has failed;
B. Well head connectors are leaking; or
C. A connection at the instrument is leaking.

When the problem is eliminated repeat Steps 1-3. If the problem cannot be corrected, record those values and make sure that the problem is well documented in the report sent to the department.

PUB002053

Step 5 - Record the stabilized reading including the oxygen concentration and barometric pressure, if available.

Obtaining true soil gas concentrations from gas monitoring wells is dependent upon using a consistent proven method. If you have problems using the sampling procedures described, you should contact the department as soon as possible.

Sampling Times

Sampling times are almost as important as the procedure used to collect the sample. Proper monitoring of the site should include sampling at those times when landfill gas is most likely to migrate. Scientific evidence indicates that weather and soil conditions influence when gas will migrate. For these reasons sampling should be considered when:

A. Barometric pressure is low and soils are saturated; or
B. When snow cover is just beginning to melt; or
C. The ground is frozen or ice covered.

Records

The Solid Waste Management Regulations require that reports on data collected from wells be submitted to SWMP at least quarterly. The SWMP recommends that gas monitoring be conducted during the months of February, May, August and November and that the results be submitted within 30 days of sampling. The data must be submitted in electronic form. The results submitted should contain:

1. The location of monitoring points.
2. Sample results obtained should include the date the sampling was performed and the barometric pressure, if available. Methane measurements may be given as a percentage of the total air volume or as a percentage of the Lower Explosive Limit (LEL). The following formula can be used to convert a percentage of LEL into a percentage methane by volume:
   % Methane (by volume) = LEL (%) ÷ 20
3. The amount of time a well is pumped before a stabilized methane reading is taken.
4. The percent volume of O_2 (if the instrument used is capable of measuring).

The form attached to the end of this bulletin may be used to record the information required by the department.

Conclusions

Missouri has stringent regulations governing landfill gas migration. The department prefers to address the issue of migrating gases before they present a threat to public safety or the environment.

Migrating gases detected above allowable limits at property boundaries do not necessarily mean that there is an immediate threat to public safety. It does mean that there is a potential problem that must be addressed. In order to address such a problem, a permit modification to install a gas collection system may be necessary.

References

Landtec Landfill Control Technologies, *Landfill Gas System Engineering Design: A Practical Approach*, course notes from Landfill Gas System Engineering Design Seminar, 1994.

Missouri Department of Natural Resources, Flood Grant Team, *Landfill Gas Monitoring Protocol*, available on the Solid Waste Management Program's web site.

For more information call or write:
Missouri Department of Natural Resources
Solid Waste Management Program
P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or (573) 751-5401 office
(573) 526-3902 fax
(http://www.dnr.state.mo.us/deq/swmp) Program Home Page

Solid Waste Management Program

Quarterly Gas Monitoring Report

Facility: _____ Permit Number: _____

Name of Sample Collector: _____

Date of Observations: _____

Type of Detection Instrument Used on Wells: _____

- in Buildings: _____

Pump Rate of Instrument Used to Monitor Wells:_____

Barometric Pressure: _____ Weather Conditions: _____

Instructions: Under "Location or Well Designation" identify the monitoring wells or describe the location for other tests (e.g., inside buildings). A drawing showing the location of test can be attached. Report methane readings in either % methane by volume, as % LEL (Lower Explosive Limit) or both. A reading in percent methane by volume can be converted to % LEL as follows:

% methane by volume = % LEL ÷ 20

Location or Well Designation	% LEL	% CH4 by volume	% O2	% CO2	Time pumped (for wells) in seconds	Comments

Location or Well Designation	% LEL	% CH4 by volume	% O2	% CO2	Time pumped (for wells) in seconds	Comments

If your facility has more gas monitoring locations than there is room on this form, please attach additional sheets listing the same information as contained on this form.

I hereby certify that the information on this form was collected by me and is correct to the best of my knowledge and belief.

SIGNATURE

Submit to: *Missouri Department of Natural Resources*
Solid Waste Management Program
P.O. Box 176
Jefferson City, MO 65102-0176

Please submit electronic copies to the above address or via electronic mail at:

swmp@mail.dnr.state.mo.us

APPENDIX B

Analytical Laboratory Statement of Qualifications
Provided by Test America, Inc.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

St. Louis

13715 Rider Trail North
Earth City, Missouri 63045
(Tel) 314-298-8566
(Fax) 314-298-8757

Elaine Wild
Laboratory Director

STATEMENT OF QUALIFICATIONS

February 2008

TABLE OF CONTENTS

SECTION 1

ABOUT TESTAMERICA ST. LOUIS

1.1 COMPANY HISTORY AND OVERVIEW

TestAmerica consists of 40 laboratory facilities in the United States. This allows TestAmerica to provide clients with an extensive experience base in the **environmental testing industry**.

The following document highlights the qualifications and experience of TestAmerica's St. Louis, Missouri laboratory, located 8 miles west of the St. Louis Airport and only 15 miles from downtown St. Louis. It is a full-service environmental and mixed waste analytical laboratory, employing 85 full time employees.

TestAmerica St. Louis has been carefully expanding its business. The laboratory currently occupies some 31,000 square feet, 2,000 of which is a newer low-level radiochemistry laboratory to accommodate the expanding numbers of low level and risk based analyses. Several other laboratories have recently been renovated and expanded to meet the growing needs of the business.

SECTION 2

CAPABILITIES – *Overview*

TestAmerica St. Louis utilizes the analytical QA/QC and reporting protocols of the U.S. EPA SW-846, EPA 40 CFR Part 136, Standard Methods and U.S. Department of Energy. We provide these analytical services in support of the following:

- Remedial Investigation/Feasibility Studies
- Groundwater Monitoring
- Underground Storage Tank Analyses
- CERCLA Investigations
- Voluntary Cleanup Actions
- NPDES Monitoring
- Nuclear Power Plants
- Real Estate Assessments
- RCRA Waste Characterization
- Landfill Monitoring

TestAmerica St. Louis prides itself on the exceptional credentials of its personnel. The dedicated staff of experienced professional chemists and technicians is the key element in the laboratory's position as a leader in environmental analytical chemistry. The majority of the staff have a Bachelors Degree or higher in chemistry, biology, environmental science or another related field.

TestAmerica St. Louis has the capacity to analyze thousands of samples per month for a variety of compounds. We understand the importance of maintaining project schedules and are committed to providing the highest quality chemical analyses and consultation services. A flexible capacity helps the laboratories meet project commitments. The laboratory operates two shifts, 7 days per week in many of the service areas. As demand for specific analytical requirements grows, TestAmerica St. Louis continues to add equipment and full-time staff.

Routine parameters performed by the St. Louis laboratory are listed in the proceeding sections. Many additional tests and services are available upon request. TestAmerica does not publish a unit price list for laboratory services because of the unique requirements in providing analytical laboratory support (i.e., various sample types, parameter lists, QC, deliverables, turnaround times, etc.). Each opportunity is quoted with attention to specific project details.

SECTION 2.1

CAPABILITIES – *Organics*

With a highly qualified Organics department, TestAmerica St. Louis provides extensive organic analyses with a comprehensive target analyte list. Our organic management team is degreed and has both technical and hands on experience in their field.

Hicks, Ben	*MS Chemistry*	*4 years experience in Organics*
Melissa Kuessner	*BA Biology*	*13 years experience in Organics*
Wenjun Han	*MS Chemistry*	*20 years experience in Organics*
Shelly Hong	*BS Food Science*	*12 years experience in Organics*

Our organic extractions laboratory is equipped with 54 Continuous Liquid-Liquid Extractors (CLLE) as well as separatory funnel extractors, for quick turnaround performance. Soils are extracted by sonication. GPC, Florisil and numerous other cleanup techniques are performed on difficult sample matrices.

Low level semivolatile analysis is performed using the Selective Ion Monitoring (SIM) technique within SW-846 method 8270C. This is extremely useful for PAH risk assessment. PAHs can be quantified to part per trillion levels without the need for second column confirmation. This is achieved by limiting the range of masses scanned by looking only for certain ions at a time and improves it's sensitivity by at least one to two orders of magnitude.

The SW-846 method 8330B is designed for trace analysis of explosive residues by high performance liquid chromatography **(HPLC).** Our **two** HPLCs are **equipped** with **Diode Array** and **UV** detectors which provide additional information to reduce the event of false positives and an increase in the number of compound determinations. **Confirmation** is performed by both **secondary column** and **spectral identification**. TestAmerica

For ultra low level **Perchlorate** and **Exploisve** are analyzing using **LC/MS/MS** instrumentation.

St. Louis utilizes the **solid phase extraction** technique for higher concentration aqueous samples. The **sonication** technique has proven most effective for explosive residue in soil samples. TestAmerica St. Louis has the technical and instrument capacity to provide both routine explosive analyses and special compound explosive lists.

SECTION 2.1

CAPABILITIES – *Organics cont'd*

DISCIPLINE		REGULATORY GROUPS & METHODS		
TEST TYPE	**ANALYTES**	**RCRA**	**CWA**	**MISC**
ORGANICS	Volatiles by GCMS	**8260B** 5030B/ 5035	**624**	TCLP/ SPLP/ 524.2
	Oxygenates by GCMS	**8260B** 5030B/ 5035		
	Semi-Volatiles by GCMS	**8270C** 3510/3520/3550	**625**	TCLP/ SPLP
	Semi-Volatiles by GCMS-SIM	**8270C** 3510/3520/3550		
	Pesticides	8081A 3510/3520/3550	608	TCLP/ SPLP
	PCBs	**8082** 3510/3520/3545/3550	**608**	TCLP/ SPLP
	Herbicides	**8151A**		TCLP/ SPLP
	Phenols	**8041**		
	Non-Halogenated Volatiles, Alcohols	**8015B**		
	BTEX plus MTBE	**8021B/OA-1** 5030B/5035		
	Fuels – Volatile (Gasoline)	**8015B**		GRO
	Fuels – Extractable (Gasoline, Diesel, Kerosene, Jet Fuel, Motor Oil, Hydraulic Fluid)	**8015B/OA-2** 3510/3520/3545/3550		DRO
	Explosives	**8330B** Solid Phase /Sonication		
	Polyaromatic Hydrocarbons (PAHs)	**8310**	**610**	

SECTION 2.2

CAPABILITIES – *Inorganics*

Our experienced Inorganics department provides extensive wet chemistry and metals capabilities. Our inorganic management team is degreed and has both technical and hands on experience in their field.

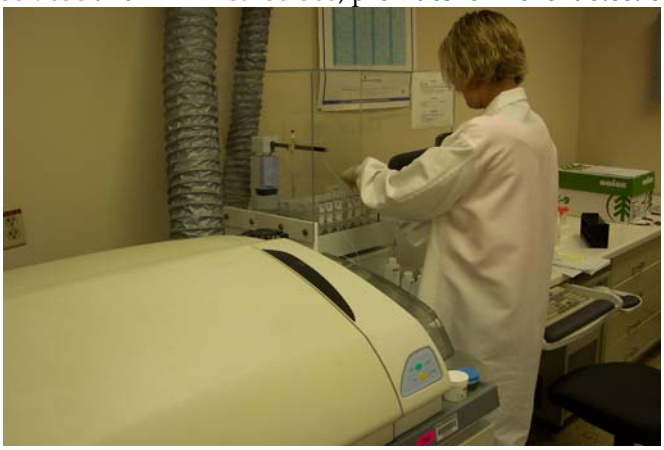
Fernando Cruz	*Coursework*	*10 years experience in trace metals analysis*
Chris Hough	*BS Biology*	*6 years experience in analytical chemistry* *2 years experience in trace metals analysis*
Mark Minier	*BS Biology*	*10 years experience in analytical chemistry*
Julie Harrington	*MS Chemistry*	*15 years experience in analytical chemistry*

For **trace metals** analysis by SW-846 method 6020 and EPA method 200.8, TestAmerica St. Louis utilizes an ELAN 6100 ICP-MS designed with features to accommodate and promote unattended analysis. This state of the art instrument offers the opportunity to obtain **lower detection limits** than conventional ICP.

ICP/MS is the ideal instrument for isotopic metals determination. Matrix interferences attributed to high levels of the common earth metals can be minimized by dilution without comprising the reporting limit requirements. **TestAmerica currently performs isotopic uranium analyses using ICP/MS for U-233, U-234, U-235, U-236, U-238 and Tc-99 with other isotopes under development.**

TestAmerica St. Louis offers **Perchlorates** by EPA Method 314.0, using an ion chromatograph **(IC)** with guard and analytical columns and a **conductivity detector**. Matrix interferences are of particular concern with this drinking water method. TestAmerica St. Louis' very low level detection allows for minimization of interferences while still attaining the detection levels needed.

Anions analysis by **IC**, namely **Bromide, Chloride, Fluoride, Iodide, Nitrate/Nitrite, Sulfate** and **Phosphate**, SW-846 method 9056 and EPA method 300, provides low level detection rapidly.



SECTION 2.2

CAPABILITIES – *Inorganics cont'd*

DISCIPLINE		REGULATORY GROUPS & METHODS		
TEST TYPE	**ANALYTES**	**RCRA**	**CWA**	**MISC**
INORGANICS	Metals by ICP	**6010C** 3005/3010/3050	**200.7**	TCLP/ SPLP
	Metals by ICP/MS	**6020** 3010/3050		
	Mercury	**7470A/7471A**	**245.2**	TCLP/ SPLP
	Alkalinity (Total, Carbonate, Bicarbonate)		**310.1**	
	Ammonia		**350.2**	
	Anions (**Bromide, Chloride, Fluoride, Iodide, Nitrate, Nitrite, Orthophosphate, Sulfate**)	**9056**	**300.0**	**Individual methods**
	BOD		**405.1**	
	COD (High & Low Levels)		**410.4**	HACH **8000**
	Corrosivity (pH)	**9040B/9045C**	**150.1**	
	Chromium, Hexavalent	**7196A**		Alkaline Digestion
	Cyanide	**9010B/9014**	**335.1/.2**	
	Ext. Organic Halogens (EOX)	**9023**		
	Ferrous Iron			**3500 Fe D**
	Ignitability, Closed Cup	**1010**		
	Oil & Grease	**1664**	**1664**	
	Paint Filter Liquids Test	**9095A**		
	Phenol	**9066**	**420.2**	
	Phosphorus, Total		**365.2**	
	Reactivity (Sulfide/Cyanide)	**SW846 Chapter 7**		
	Specific Conductance	**9050A**	**120.1**	
	Sulfide	**9030B/9034**	**376.1**	
	Solids (TDS, TSS, TS, TVS)		**160.1/.2/.3/.4**	
	Total Organic Carbon (TOC)	**9060**	**415.1**	
	Total Organic Halogens (TOX)	**9020B**	**450.1**	
	Turbidity		**180.1**	

SECTION 2.3

CAPABILITIES – *Radiochemistry*

Our technical strength in Radiochemistry provides TestAmerica St. Louis with great opportunities and depth in drinking water, wastewater, vegetation and solid waste radiochemical analysis. Our radiochemistry management team is degreed and has both technical and hands on experience in their field.

Rhonda Ridenhower	*BS Biology*	*8 years experience in Radiochemistry*
Sarah Shafer	*MS Biological Science*	*3 years experience in Radiochemistry*
Sarah Hurst	*BS Biology*	*4 years experience in Radiochemistry*

TestAmerica St. Louis operates two independent radiochemistry sample preparation laboratories in order to provide testing for both the routine level and low level needs. We recognize the vital importance of proper sample preparation and have degreed and experienced staff in our **chemical separations preparation** and **actinide preparation** areas.

TestAmerica St. Louis utilizes an **Alpha Spectroscopy Counting System (72 detectors)** to provide isotopic analyses for **Uranium, Thorium, Neptunium, Americium, Plutonium, Curium and Californium.**

Using seven **Gamma Spectrometers, (Intrinsic Germanium detectors**) the laboratory is able to analyze many samples using isotope libraries suited to the project, including naturally occurring radioactive material (**NORM**). One thin film detector is available for low energy analyses such as I-129.

Using **Gas Flow Proportional Counting (GFPC) low background (60 detectors),** the laboratory has a vast capacity to analyze samples for **gross alpha/beta**, **Strontium 89/90, Chlorine-36** and **Radium 226/228**.

The laboratory analyzes a variety of matrices for tritium, C-14 and specialty isotopes such as Ni-59/63, Fe-55, P-32, S-35, and Pu-241 using three **Liquid Scintillation Counters.**

Natural Uranium by **Kinetic Phosphorescence Analyzer** (**KPA**) is a quick, cost effective method to determine the level of uranium in water and soil samples.

SECTION 2.3

CAPABILITIES – *Radiochemistry cont'd*

DISCIPLINE		REGULATORY GROUPS & METHODS		
TEST TYPE	**ANALYTES**	**RCRA and DOE**	**CWA**	**Instrument**
Radiochemistry	Gross alpha/beta	**9310, HASL 300**	**900.0**	GFPC
	Gross Alpha by co-precipitation			GFPC
	Strontium 89, 90, total	**HASL 300**	**905.0**	GFPC
	Radium 226, 228, total	**9315/9320, HASL 300**	**903.0/ 904.0**	GFPC, Alpha Spectroscopy
	Lead 210			LSC
	Chlorine 36			GFPC
	Iron 55			LSC
	Nickel 59/63			LSC
	Promethium 147			LSC
	Polonium 210			Alpha Spectroscopy
	Technetium 99	**HASL 300**		LSC
	Tritium	**HASL 300**	**906.0**	LSC
	Carbon 14			LSC
	Gamma Spectrometry (including Cesium 137 and Radium 226 - contact us for a complete list of isotopes)	**HASL 300**		Gamma Spectroscopy
	Iodine 129	**HASL 300**		Low energy Gamma
	Actinide Series:			
	Americium 241	**HASL 300**		Alpha Spectroscopy
	Neptunium 237	**HASL 300**		Alpha Spectroscopy
	Plutonium 238, 239/240, 242	**HASL 300**		Alpha Spectroscopy
	Plutonium 241			LSC
	Thorium 228, 229, 230, 232	**HASL 300**		Alpha Spectroscopy
	Uranium 232, 234, 235, 238	**HASL 300**	**908.0**	Alpha Spectroscopy
	Uranium		**ASTM 5174**	KPA

SECTION 3

PROJECT MANAGEMENT

The cornerstone of our business is **customer service**. We have a knowledgeable, experienced project management staff with a commitment to customer satisfaction. Our goal is to work in partnership with our clients. This team relationship allows us the opportunity to apply our skills and understanding of regulatory requirements from a laboratory perspective, thereby optimizing the analytical work for a given project. The TestAmerica St. Louis Project Management team:

Jerry Everett	*MS Chemistry*	*1 year experience in Project Management* *12 years experience in Environmental*
Ivan Vania	*BS Chemistry*	*1 year experience in Project Management* *18 years experience in Environmental*
Sherryl Adam	*BS Biology*	*3 years experience in Project Management* *10 years experience in Environmental*
Terry Romanko	*BA Chemistry*	*4 years experience in Project Management* *19 years experience in Environmental*
Jim Kleszczewski	*Course work*	*4 years experience in Project Management* *24 years in Environmental*
Kay Clay	*BS Business*	*4 year experience in Project Management* *24 years in Environmental*

It is our standard practice to **assign a Project Manager as the single point of contact** to each of our clients. Efficient and effective project management is of prime importance to the successful execution of any contract and building lasting client relationships. Our Project Managers are involved from project initiation to completion: from the time of initial client contact; in dialogue with the client during the entire project; and available to answer questions or provide additional information after project completion. We understand the importance of establishing and maintaining open lines of communication during all phases of a project.

SECTION 3

PROJECT MANAGEMENT – *cont'd*

The Project Manager is the primary client contact and has access to all of the resources of the lab to obtain technical expertise and/or resolve resource management and scheduling challenges on behalf of the client. The Project Manager will:

- Respond to the client in a timely manner to all requests.
- Provide pricing and technical information.
- Interface with project personnel to plan and schedule sample shipments to the laboratory.
- Organize, schedule and facilitate project meetings with the client as needed.
- Serve as consultant for field efforts to optimize batch sizes, arrange sample shipment/receipt, provide bottles and associated materials.
- Document the client's technical requirements to the laboratory staff.
- Monitor conformance of analytical protocols, quality assurance, and data reporting with contract and technical requirements.
- Assess cost and schedule requirements.
- Obtain additional laboratory capacity from other TestAmerica facilities as necessary.

When samples are received at TestAmerica, strict chain of custody procedures are followed and documented. Any inconsistencies are immediately brought to the attention of the TestAmerica Project Manager for resolution with the client. All discrepancies are documented in a Condition Upon Receipt report (CUR). Transfer of samples within the laboratory is tracked electronically using a bar coding system.

TestAmerica St. Louis Project Managers and laboratory Section Managers have a commitment to maintain project schedules with a goal of 100% on-time delivery of quality data packages. If at any time, a delay in the required project turnaround time is anticipated, the Project Manager will immediately contact the client and inform them of the nature of the problem, the corrective action taken and a revised delivery date for the analytical data report.

SECTION 3

PROJECT MANAGEMENT – *cont'd*

Normal office hours are 8:00 am to 5:00 pm, Monday through Friday. Sample shipment and receipt are available on weekends, as needed. TestAmerica realizes that field-sampling constraints may dictate a project schedule and are adept at accommodating these modifications in schedule. Advance notice for weekend receipt is requested to ensure that the appropriate laboratory personnel are available for short hold time analyses. For after-hours contact, telephone numbers for the appropriate TestAmerica project managers are available.

3.1 DATA DELIVERABLES

TestAmerica St. Louis has a dedicated data package production/assembly staff. The department personnel review each data package for completeness and consistency. The types of Data Deliverables available at TestAmerica St. Louis include:

- **Standard Commercial Report** - *provides a narrative describing any anomalies, chain of custody, condition upon receipt report and a sample data report, which includes a Quality Control performance summary.*
- **Custom Report** - S*pecific project requirements are agreed upon regarding project QA/QC and deliverable requirements.*
- **Validatable Data Package Report** - *provides a narrative describing a chain of custody, condition upon receipt report, sample results and QA/QC form; raw instrument data including spectra and chromatograms, extraction logs and standard preparation logs.*
- **Electronic Data Deliverables** (EDD) - *over 75 different formats*

3.3 QUALITY ASSURANCE PROJECT PLAN ASSISTANCE

TestAmerica St. Louis offers assistance to clients in preparing project specific Quality Assurance Plans. Our staff has written and/or assisted in writing numerous Project Specific Quality Assurance Plans for work the laboratory has performed under EPA, DOD and DOE oversight. We are knowledgeable regarding the fundamental requirements and have experience with the approval process.

SECTION 4

MyTestAmerica

TestAmerica strives to lead the environmental industry in technology, quality and service. One of the most successful areas is in providing clients access to analytical data, anytime and from anywhere. TestAmerica St. Louis offers to our clients, at no additional cost, access to data over the Internet using the **MyTestAmerica** system. **MyTestAmerica** is a web based project information tool that can serve as/to:

- **Provide real time access to data in our LIMS, including analysis status information, and preliminary analytical results**
- **Verification of sample login**
- **Sample receipt and sample condition information**
- **Maintain project contact listings**
- **A repository of project specific information to upload and access any type of project specific file**

SECTION 5

QUALITY

5.1 QA/QC OVERVIEW

The goal of the **TestAmerica St. Louis Quality System** is to ensure that business and technical operations are conducted with the highest standards of professionalism.

To achieve this goal, it is necessary to provide TestAmerica St. Louis clients with not only scientifically sound, well documented, and regulatory compliant data, but also to ensure that TestAmerica St. Louis provides the highest quality service available in the industry. A well-structured and well-communicated Quality System is essential in meeting this goal. TestAmerica St. Louis' Quality System is designed to minimize systematic error, encourage constructive, documented problem solving, and provide a framework for continuous improvement within the organization.

Our Quality Assurance Department is comprised of professionals experienced in laboratory techniques and quality assurance objectives. This department initiates and oversees the entire Quality System and its' training to all personnel, as well as maintaining a **Laboratory Quality Manual** (**LQM**) and **Standard Operating Procedures** (**SOP**), ensuring that the laboratory's quality system and LQM meet the requirements set forth in the TestAmerica **Quality Management Plan** (**QMP**) and address the client's specific project requirements.

Marti Ward	*BS Education*	*4 years experience in Quality Assurance* *24 years in Environmental*

Our QA staff is available to every employee at the facility to resolve data quality or ethical issues. The QA staff has the final authority to accept or reject data, and to stop work in progress in the event that procedures or practices compromise the validity and integrity of analytical data.

Quality control procedures ensure that all data generated in the laboratories conform to specific requirements for accuracy, precision, and completeness and that data are of known quality and are legally defensible. Quality resources are primarily allocated to the prevention of defects, and corrective actions are focused on root-cause identification and elimination of problems.

5.2 AUDITS AND PERFORMANCE PROGRAMS

Audits are comprehensive and scheduled periodically by QA to ensure compliance with the laboratory QA/QC procedures and project-specific requirements. TestAmerica St. Louis QA staff perform quality systems and technical data internal audit in addition to conducting external audits on behalf our clients and other TestAmerica locations. TestAmerica St. Louis participates in numerous federal, state, and industrial audit and performance testing programs for organic, inorganic, and radiochemical analyses, (copies of results
are available upon request):

- **Environmental Resource Associates (ERA) WS/WP/SW and Radiochemical (2x yearly)**

- **Mixed Analyte Performance Evaluation Program (MAPEP); water/soil**
- **QAP**
- **Client sponsored PT programs**

5.3 STATE CERTIFICATIONS AND AGENCY APPROVALS

TestAmerica St. Louis is approved through **Florida** for the **National Environmental Laboratory Accreditation Program** (**NELAP**).

- **State Certifications, e.g. Utah, New York, California**
- **Department of Agriculture (USDA) Foreign Soils Permit**
- **U.S. Army Corp of Engineers (USACE)**
- **US Department of Energy (DOE) approval**
- **U.S. Nuclear Regulatory Commission (NRC) License**

SECTION 6

EXPERIENCE

6.1 PROJECT EXPERIENCE

TestAmerica St. Louis has provided environmental chemical analyses for over 15 years. We have an experienced staff working together as a team, creating an organization with extensive knowledge of the environmental field and a high level of internal cooperation.

Our success is built on developing productive, on-going relationships with our clients. TestAmerica's client base is widely varied; some of the types of clients and projects we serve are listed below:

Anheuser Busch
Bechtel Jacobs
Black & Veatch
Boeing
Burns & McDonnell
Cabrera Services
CH2M Hill
Clauss Construction
Conestoga-Rovers & Associates
Conti Environmental
Desert Research Institute
Duratek
Earth Tech
Environ
Exelon
Hanson Professional Services
Honeywell
Jacobs Engineering Group
Koch Industries
Laclede Gas Company
Mactec
Mallinckrodt
MKM Engineers
Montgomery Watson Harza
New World Technologies
New Jersey DEP
Pangea Group
Parsons Engineering Science
Pharmacia
Safety & Ecology Corp.
SAIC
Shaw Environmental
Sigma Chemical
S. M. Stoller
Solutia
TetraTech
U.S. Air Force
U.S. Army Corps of Engineers
U.S. Department of Energy
U.S. Navy
URS Corporation
Weston Solutions

TestAmerica ST. LOUIS - PROJECT EXPERIENCE

Client/Location	Dates	Programs	Project Highlights
Pacific Northwest National Laboratory / DOE Hanford	1995 to present	DOE Site Clean-up	TestAmerica's comprehensive contract with Hanford provides the support to all on-site firms to send samples off-site for analysis. The TestAmerica-St. Louis facility provides the required environmental chemistry analyses. TestAmerica is also the primary laboratory supporting the groundwater monitoring project. Remedial projects include matrices of soil, construction debris, concentrated chemicals, and other unknowns needing to be identified.
MKM Engineers	2002 to present	DOD Site Investigation	TestAmerica provides chemical and radiochemical analyses to support the activities at several DOD facilities. Analyses have supported waste characterization, remedial action and site investigation.
Pantex	1995 to present	DOE Site Investigation	TestAmerica has provided radiological and chemical analytical support services for all environmental activities at the Pantex facility continuously for the past eight years, processing thousands of samples. Analyses support the groundwater monitoring program, site investigation characterizations and clean-up activities. TestAmerica developed the capability to analyze for specific explosive parameters, exclusive to the Pantex site.
Brookhaven National Laboratory	1990 to present	DOE Site Clean-up	Typical analyses for the environmental programs include volatile organic, semi-volatile organics, metals and radiochemistry in water, soil, and waste sample matrices. Radiochemical procedures include uranium, radium, thorium, strontium, gamma spec and tritium analyses. TestAmerica also performs analyses on air and biota samples in support of the site monitoring program.
SAIC	1992 to present	FUSRAP, CERCLA, DOE Site Clean-up	TestAmerica St. Louis performs radiological and chemical analyses for surface water, groundwater, soil and waste samples in support of activities at several sites across the U.S. The chemical analyses include semivolatiles, volatiles, metals, herbicides, pesticides, PCBs, and water quality parameters. The radiological parameters include gamma spectroscopy, gross alpha/ beta, isotopic thorium, isotopic uranium, isotopic plutonium, tritium and radium 226/228.
Tyco Healthcare/ Mallinckrodt	2004 to present	NPDES	TestAmerica provides analytical support to Tyco Healthcare for their wastewater program. Analyses include inorganic and organic parameters and specialty analyses specific to the pharmaceutical industry.